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THE NEW ZEALAND GRASS-GRUB.

SOME NOTES ON ITS CONTROL.

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THE life-history of our ordinary grass-grub (*Odontria zealandica*) has never been really systematically worked out under controlled conditions, but sufficient is known to indicate what takes place. The eggs are laid on the surface of the ground, generally at the base of plants. In general, land that is ploughed and free from plants during the egg-laying period does not suffer from grass-grub attack the following season, but this may be due to the extra cultivations the ground receives during and after egg-laying.

Egg-laying is likely to take place during the whole period that the adult beetles are about—roughly from the end of October to the end of February. In general, however, the main egg-deposition takes place between the first week in November and the first week in December. Adult beetles have been found on the wing during most of the months of the year, but except for the great brood that emerges in November they are not of any great significance. The young grubs feed on the roots of plants, especially those of a fibrous

nature, such as those of the grasses. Many tap-rooted plants are also fed on. When the roots are young and in the seedling stage any type of plant, including forest-trees, is likely to be killed. The grubs may attain full growth before the winter and remain then in a more or less quiescent state, feeding again energetically in the early spring and pupating during October. If feed conditions have been bad the grubs may not have reached the pupating stage in October, and their emergence is thereby delayed, but in nearly every year the main brood is in a state of pupation during October. The odd emergence of beetles, during months other than what may be termed the normal ones, is due to delayed emergence and to egg-laying having occurred at varying periods of the year.

CONTROL PRACTICE.

For the control of grass grub on farm land there is no practical method of destroying the pest by trapping, poisoning, burning, or by soil-fumigation and chemical treatment. Quite small areas can be dealt with by soil-fumigation with carbon bisulphide and certain insect-repellants, but such methods do not and cannot enter into farm practice. With our present knowledge, all that one can do is to avoid those practices that encourage rather than restrain the development of the beetles. The ravages of the insect are more or less periodic, which is due to two factors—an increase in the number of grubs over any particular area, and extremely dry weather conditions setting up lessened root-production. When both these factors operate at the same time the destruction caused is very great. On virtually no grassland in New Zealand is the grass-grub ever absent, but unless there is present more than a certain number to a given area—say, per square yard—the damage caused is not of any great consequence. The dryness of the soil and its fertility have, however, a great influence on the number of grubs grassland can support without the grass dying out. On rich moist soils, with an equal grub-content to inferior dry ones, often no injury may be apparent, while the grass on the poor dry soils may be completely killed. This statement may not appear sound when one thinks of the great damage caused to lawns even in a moist season and on the richest of soils, but in such cases it must be remembered that in most instances the individual root-development on lawns is poor owing to the extreme crowding of the plants.

When grass-grubs are "working" in large numbers on grassland they thoroughly pulverize and loosen the ground below the first 2 in. or so from the surface, and lessen the capillary rise of water to the soil-surface. Thus in dry weather the grasses that have been eaten through cannot rapidly form new roots, as the surface layer of soil becomes too dry. In districts of regular and abundant rainfall, however, even when the grass-roots are eaten through, new ones rapidly take their place; and unless the number of grubs is excessive very little injury results, although certain slow-rooting species may be killed out, and a distinct change in the composition of the herbage takes place.

So far as grasslands are concerned, the main damage is caused either in their first year of development—mainly in the autumn

following spring sowing—or on grassland that has been established some years, when the grasses have passed their most vigorous root-development stage. With young grass the losses are often serious, but it has been amply demonstrated that grass sown with rape often escapes damage, while grass sown with a cereal that is harvested is frequently killed out in the autumn following sowing. It is customary to explain this as due to the heavy grazing of rape crops at or about the time egg-laying takes place or when the grubs are quite small. In general, however, rape land is not stocked until well after the main egg-laying has been completed, and I am inclined to think that the ground being virtually bare at that time it is not selected by the beetle for that purpose. Investigational work on this point is much to be desired, but the fact remains that grass sown with rape in October–November generally escapes damage.

The main reasons why grass sown with cereals—more especially oats spring-sown—becomes seriously damaged in many districts is due to the readiness with which beetles lay their eggs in cereal crops, and also—and this is most important—the weak rooting and poor esta-

ODONTRIA ZEALANDICA, ABOUT LIFE-SIZE.

1, 2, and 3, larval stages; 4, beetle. The grub is a dirty white colour, with brown head. The beetle is brown. The beetle is a night flier only, and in November and December may be observed flying with a buzzing noise just after dark. It often feeds on leaves of plants and trees, causing appreciable damage.

blishment of the grass when its full moisture-requirements have been stinted through the growing of a harvested cereal crop. So far as rotation-cropping land is concerned it would appear to be a sound practice to sow down grass only with rape, but unfortunately more grass has to be sown each year than can be provided by the rape acreage. Still, in all districts where grass-grub is usually prevalent rape or turnips should be made the last crop of the rotation rather than the first, as is often done, the grass seeded down with a cereal being in this way decreased as far as possible.

QUESTIONS OF TILLAGE AND CROPPING.

So far as older grassland is concerned, where perhaps a gradual increase in the number of grubs each year has taken place until they are more numerous than the grass can support, nothing of any practical nature can be done except reseeding or rotation cropping. Our knowledge of the effect of tillage and cultivation on the destruction of grass-grubs in the ground is very slight, and a question that is often asked is, What crop should be sown on really badly infested land? If the land in question is lea land it should, if possible, be

worked in the late spring and kept fallowed until the autumn, when it can be sown with a cereal, the later the better, as the amount of damage caused in the winter by grass-grub is small. Again, if the land is required to be cropped the same season as ploughed, any crop sown in late October should generally escape damage, and thus summer forages, linseed, and perhaps barley in the North Island should be fairly safe on land badly infested the previous autumn.

It is, however, with stubble land that the main difficulties occur, as such land may be extremely badly infested with young grubs derived from the egg-laying of the previous November. Wheat following wheat is frequently damaged by grass-grub, especially if sown early, due to infestation of the land while the first crop was on the ground. Where a cereal is to follow a cereal it should be either sown very late in the autumn or not sown until the spring. Thus winter wheat followed by spring-sown oats is generally a sound enough practice in many districts, but sowing of grass with such oats is unsound, as egg-laying occurring while the oats are standing may destroy the young grass after the oats are harvested.

I think that where oats end the annual crops of a rotation the grass-sowing should be delayed until the autumn, but it is not known just what kind of cultivation is best to precede the sowing. It is popularly supposed that heavy rolling has a great effect on grass-grub, but the effect of this operation is undoubtedly indirect and can be attributed to the ordinary effects of rolling on plant-growth, rather than to any harmful effect on the grub. In many cases rolling lawns infested with grass-grub has given quite excellent results, but in such cases the real cause of the lessened effect of the grub is in all likelihood the less interrupted water-movement from below upwards, due to the consolidation of the virtually dry mulch formed where the grubs are working. The same explanation appears to be sound also in connection with the often observed undamaged condition of young rye-grass growing in the threshing-machine wheel-marks of a paddock. Undoubtedly any practice that will promote rapid and vigorous root-development must be beneficial, and the production of a good tilth and firm seed-bed, coupled with considerable phosphatic manuring to promote root-growth, appears to be of great value in warding off the effects of grass-grub.

The effect of lime is frequently brought up in connection with grass-grub, but no exact work in this connection has been done. It has been frequently noted that grasslands on limestone soils show less grub-damage than on soils where the lime-content is low. From my observations, this is not due to the absence of grass-grub in the former, but may be accounted for by the better soil conditions for grass-growth. The idea that lime is useful in controlling grass-grub is perhaps due to the apparent effect of limewater in bringing up grubs to the surface, but this is quite a common occurrence when soils are suddenly saturated.

RESISTANT PASTURE-PLANTS.

Another question that is frequently asked is, What pasture-plants are most immune from attack? In general, clovers—especially red clover—are more resistant to attack than are the grasses, and the

same applies to many pasture weeds that have strong, long tap-roots, such as catsear, rib-grass, and the like. In many parts of Canterbury the development of catsear and rib-grass associations on old pastures is largely due to the grasses having been killed out by grass-grub. Among the grasses, cocksfoot and crested dogstail both resist attack well, especially the former, although the roots of both are freely eaten. Perennial rye-grass is especially liable to be killed, and for this reason the using of small amounts of cocksfoot—2 lb. to 4 lb. per acre—in short-rotation mixtures has become customary where grub is usually bad. The custom is generally a bad one, as when a severe attack occurs the rye-grass (by far the most dominant element sown) is killed out, and the small amount of cocksfoot that is left is not sufficient to yield much feed, but often tempts the farmer to leave the land in grass, hoping that the bare ground will fill up. In country where grass-grub is ordinarily bad grass-seed mixtures should have their rye-grass content reduced in favour of cocksfoot and crested dogstail, and where the soil is suitable the clover-content should be increased. Danthonia pilosa appears to withstand grass-grub attack remarkably well, and where on hill country liable to periodic infestation this grass is amongst the few permanent ones that can be established it should always be included in the mixture. Another plant that appears to withstand grub-attack to a remarkable degree is yarrow, and its great spread and persistence in old pastures in many parts of Canterbury is probably due to its almost complete immunity from grub-injury.

SMALL AREAS.

With regard to garden areas, control should always be in the direction of cultivating the ground as much as possible during the egg-laying period. On very small areas, and on small lawns where cultivation cannot be adopted, soil-fumigation with carbon bisulphide may be adopted, as already mentioned.

NOTE. — Other articles on the subject of grass-grubs by the writer have appeared in the *Journal* for September, 1911, and December, 1912.

Redwater in Cows.—In this country redwater is due to a variety of causes, which could be nearly all embraced under the conditions existing about three weeks before calving and three weeks after. Frosted feed is a common cause, and a too liberal supply of almost any root crop or green feed during this period is apt to bring on the trouble. There is no more reliable feed for cows for a week or two before and after calving than grass, supplemented with hay where necessary, or limited quantities of other feed. The cure for redwater, of course, depends upon the cause, which should be removed if possible—for instance, by change of feed. At the same time the cow should be kept dry and warm, and given a drench consisting of ½ lb. Epsom salts, 2 lb. treacle, and ½ oz. turpentine. An animal which gets very low may often be kept alive by drenching with oatmeal gruel and a couple of large bottles of beer per day.—*Livestock Division.*

PASTORAL FARMING IN THE SOUTH.

A SOUTHLAND CALENDAR.

W. J. A. McGREGOR, Mount Linton, Southland.

[The following notes on the yearly routine of pastoral farming in Southland are published mainly with the object of affording some practical hints to new or inexperienced local settlers and many of the young men now taking up grazing-runs. They also form an interesting outline record of this class of farming in the southern part of New Zealand generally. It will be observed that while the branch of agriculture dealt with is primarily grazing on tussock country of more or less height, a very considerable and essential amount of cropping is practised on arable parts of the holdings for the provision of winter and other extra feed, this maintaining a good standard of farming. Mr. McGregor is a well-known Southland settler of long experience, whose property, Mount Linton, affords an excellent example of the class of country and farming described.—EDITOR.]

JANUARY.

BEGINNING with the first month of the calendar year, January finds the Southland pastoralist in mid-shearing. As a rule the dry sheep have already been shorn, and the shearing of the wet ewes is now on. This work we like completed before the middle of the month if possible—before the "biddy-biddy" (piripiri) seed gets into the wool too much. In some seasons, of course, the burrs are earlier and in some later, but it is found as a rule that after the second week of January they have matured and begin to stick badly on the wool. Cuts or mobs of the wet ewes (breeding-ewes and lambs) are carefully mustered in from their blocks of country or paddocks, and placed handy to the shed as they are wanted. The ewes are shorn and replaced with their lambs as soon after as possible on the ground they were mustered from, as the lambs mother up best in their own country. Should bad weather restrict their return, and they are detained in some sheltered spot for a day or two, the ewes fret and wander round the fences, and the lambs refuse to mother. The longer they are thus detained, especially if the weather is rough, the more tender and inflamed the ewes' udders become, with the result that they refuse to allow the lambs to suckle. As a consequence—unless the lambs are well grown and able to fend for themselves at this stage—there may be an undue proportion of cull lambs at weaning-time. With a few favourable days the cut-out of the wet ewes arrives and the main shearing of the season is over. The "boss" superintends the clearing up, receiving the machine gear (if machines are in use), which should be cleaned up before handing in.

Meanwhile the shepherds are busy fixing up the shorn sheep, finishing branding and mouthing, and taking out all the dry ewes (if this has not been done at lamb-marking), thus lightening the country so that the wet ewes and their lambs may thrive better. It is, however, preferable to do the mouthing and culling (which are practically combined by many) in the wool before the sheep go into the shed, as sheep defective in wool are then not so readily missed. The lambs of each mob or cut of ewes have been drafted off before the

ewes go into the shed, and placed in some secure place adjacent, where they are gone through before replacing with their shorn dams. All poddy or motherless lambs should be taken out and placed in some good paddock where they will make good. Any long-tailers missed at marking-time are now operated on and marked. This is always more or less risky, and it should be done in some clean pen free from dust, and wounds dressed with an antiseptic, or turps and oil. The operation is best done towards evening, when it is cool and the lambs are empty, after which the sooner they are away from the dusty yards and the quieter they are handled back to their mothers the better. If raced about dusty yards with dogs some loss can be expected for a certainty.

Although the shearing, while it is on, has been absorbing most attention, the teams will have been quietly pushing on with the turnip-sowing, or, if the opportunity presents itself, cutting and securing some hay for the coming winter. After the main shearing is over and the shorn sheep are all placed out the next move is to muster the stragglers —"woollies" that have been missed. These are mustered in from all over the run, as well as received in exchange for other stragglers with neighbours. Meanwhile, during this muster the teams may be busy carting the wool to the nearest railway-station *en route* for sale. The back-loading of stores, coal, or other requirements is availed of as the wool is carted away. After the carting is finished turnip-sowing is completed. Then the grass-seed may be ready to cut, as it usually is towards the end of January. About the beginning of the month the bulls are put out with the breeding-cows.

FEBRUARY.

The shearing of the stragglers is usually an opportunity for some of the boys to learn the art. A day or two sees the stragglers sorted up and branded, and away out to some secure paddock or block where they are not likely to get back to their old haunts. With fine weather the grass cut for seed will now be ready for stacking, which work is carried out. The oats usually grown for supply of chaff and horse-feed will probably be ready to cut and stook.

The stud ewes and their lambs will now be brought in for weaning and dipping. The lambs after being drafted, sorted up, crutched, branded, and dipped are placed on good, clean, fresh feed—the ram lambs in one paddock and the ewe lambs away separate in another. Any culls will also have been taken out from both the stud ewes and lambs. Stud and flock rams are next sorted up. Culls that were marked as such when in the wool prior to shearing, together with any others that it now seems advisable to cull out, are drafted off and disposed of as suitable. Before dipping the rams it is well to go thoroughly through them, turning them up and trimming their feet if required, and looking out for any defects that may catch the eye. In this south-western part of the country we have endeavoured to produce rams of a good bold appearance, large of bone, square-framed, standing well set on their four legs, with a well-set strong head, and a covering of dense even-quality wool.

February is usually the driest month of the year in this district, hence every opportunity should be taken to push along harvest work.

Other work for which this month is most suitable is cutting weeds and rabbit-poisoning. Where poisoned pollard is used the baits should be dried as hard as shot, as we have found that the rabbits take them better in that condition. In laying the baits we simply drop them on the bare feeding-spots, about the warrens, and among the tussocks, and seldom do we find the sheep taking them on the native pasture. In the paddocks the sheep are more likely to do so, and have to be shifted. Other work that can also be carried out is the preparation of stack-bottoms, stacking if the crop has been cut early, and thatching hay or oat stacks.

MARCH.

About the last week of February a start will have been made with the weaning and dipping muster of the hill ewes and their lambs, and this work goes on in March. As each mob is brought in it is drafted, and the lambs divided into the keeping and sale lambs. The keeping-lambs are crutched, branded, dipped, and placed out as soon as possible on a piece of warm, clean, native grassland that has been saved throughout the summer, or perhaps in spelled paddocks. This gives them a good opportunity to forge ahead as hoggets, to get used to their ground, and be in good order to face ordinary winter conditions. A good salt-lick should be placed here and there, which will help to keep them in good health. The ewes also, after the culls have been drafted off, are dipped and placed out again. The sale ewes and lambs are dipped and placed in good separate paddocks prior to going to sale, or awaiting delivery if already sold.

Now that March is well in, no chance must be lost of getting the oats stacked, as missing any opportunity this month may mean weeks of waiting, during which the action of birds and rabbits is very detrimental to the stooks.

APRIL.

April is also a busy month with the stock. The stud rams are put out during the first week with the stud ewes, which will have been graded to suit the rams. The dry sheep are mustered in from off any high or back country, and are sorted up and dipped and placed on their winter country. The dry sheep mustered in for dipping will consist mostly of the maiden ewes (four-tooth), two-tooth ewes and wethers, and probably odd lambs. Any culls will be taken off and either sold or put on turnips, whichever may be deemed most profitable. The four-tooth maiden ewes are retained for breeding purposes, and the other dry sheep put back on their country after being dipped. Cattle should also be sorted up, calves weaned, and any cull cows disposed of. Forward steers will be sold, unless there is plenty of turnips and hay or straw to finish them off.

All carting of heavy stuff, such as coal and other necessaries, should be completed this month in order to save the roads, such heavy traffic being prohibited in most counties from 1st May to 30th September.

MAY.

In the second week of May the flock rams are put out—about one to forty-five ewes on hill country. The rams should be sound, vigorous, and strong, as on hilly country they may have a good deal

of travelling to do. Six weeks is long enough for the rams to be out. During the last two weeks it is a good plan to slip out a few extra rams that have been kept in reserve, in order to quicken off the tupping. While the rams are out the ewes should be frequently turned in to save the rams missing any. While doing so the shepherd on his rounds skins any dead sheep he may drop across, or gathers up any dead wool that may have been missed. Other sheep should also be looked round frequently—the dry sheep (two-tooth ewes and wethers) on their country and the hoggets on theirs—to see that they are not hanging about too long in any places that are beginning to get bare and dirty. If good paddocks are available for holding the ewes while with the rams the chance of the ewes getting in lamb is, of course, much better, but should the paddocks be bare, then both ewes and rams are better out on the hills.

Preparations for feeding off turnips will commence about the middle of this month, unless any lamb-fattening may have been taking place, when the lambs would need to have been put on in February or early March. Most pastoral holdings simply grow enough turnips to winter store sheep or backward sheep that may be improved by so doing. Breaks not too big should be erected, otherwise turnips will be more or less wasted, and a good run-off should be provided. Hoggets should get a fresh break each week or two, to themselves if possible, letting older sheep clean up behind them. It may be found difficult to get tussock lambs or hoggets to eat turnips for a start, but persistence and coaxing for about a week is all that is required. Close them in for a few hours a day and take them off at nights until they have cultivated an appetite for the roots, when there will be no stopping them.*

During this month all sheep that are to be turniped or kept about the paddocks should be crutched. There is not the same need to do so with tussock-country sheep, and fortunately we have no fly trouble in the South. It pays to take the wool off clean. After tupping is over we simply turnip the rams. Stud ram and ewe hoggets, stud ewes (for six weeks), medium hoggets, two-tooths, and a few wethers and backward ewes we also turnip.

Once the sheep work is out of the way the weaning of calves from the breeding-cows takes place. This is usually carried out by simply placing cows on one side and calves on the other side of a sound wire fence with a good barb on it. In about a week's time they will have settled down and can be shifted. An odd calf may get through to its mother, but if put back may remain. The calves should be placed on good feed, with a bit of hay or straw to pull at, and later—say, in July or August—given some turnips. I find they winter well out on the native grassland with the hoggets, in good rough sheltered gullies.

Throughout May (and during the ensuing months until September) the team or teams will have been busy at all opportunities ploughing up

* A lick I have found these young sheep very fond of and very beneficial to their health consists as follows: 1 bag (180 lb.) salt, 50 lb. builder's lime slaked, 30 lb. superphosphate, 3 lb. to 4 lb. sulphur, and 5 lb. sulphate of iron, mixed up, then wetted and moulded into blocks, and taken out as required. This lick, however, should be used only for dry sheep and not given to breeding-ewes lest aborting occur.

stubble or lea land. The earlier the ploughing is done the more satisfactory the results, and the less working required, due to the frosts pulverizing and sweetening the soil.

JUNE.

With the coming of June the grass-paddocks will begin to get shorter. Looking after the turnip sheep and erecting breaks takes up much of the time. June is usually a fairly dry month, and it is a good plan to cut plenty of chaff, enough for well into August. The sheep work being practically finished, all that is now required is simply looking after the sheep and seeing that they are well placed to face the next two months. Yards and fences that need repairing should be attended to whenever any opportunity arises. Rabbit-poisoning may be carried out to some extent, satisfactory results depending on the weather. Cattle can also be attended to and placed in decent winter quarters. By the end of the month the rams will all have been collected and brought in and placed on the turnips.

JULY.

In July we can expect wintry weather, demanding close attention to stock that are on turnips or about the paddocks. Sheep out on the hills, provided there is not much snow, will be all right. Hoggets out on native pasture need looking to and shifting out of any dark faces. Some salt-lick placed about in sheltered rock-crevices or boxes will always benefit hoggets and help to keep down worm troubles. If the ground is too frosty to plough there is always plenty for the teams to do carting out hay or straw to racks in the paddocks for cattle, sheep, or horses, and turnips for milking-cows ; also carting out stable manure for top-dressing near paddocks. If there are sufficient turnips, calves should get a few with a rackful of hay or straw.

In broken weather there will be wool or crutchings in the shed to clear up, as well as skins to pack for sale. Harness should also be oiled and overhauled in wet weather. Rabbit-poisoning must be pushed on this month when suitable. Gorse-cutting, splitting fencing-material, and other similar work should also be carried out.

AUGUST.

With the arrival of August the busy periods of spring and summer loom up. Much work is ahead, and no opportunity for pushing on should be missed. Ground that has been ploughed during the last few months and may be dry enough can be sown in oats. The ploughing of ground intended for turnips may be also pushed on to help the soil to sweeten and mellow down. It will be as well to carry out any spring dipping this month if possible. If dipped early in spring, sheep that have been wintered on turnips with the intention of holding over for shearing seem to thrive and come along quicker as feed improves, and casting is much lessened.

Sheep out on tussock country will have been tended from time to time, and the shepherd on his rounds, if he has an eye for his work, will note how the sheep are lying on the country, and will see at once where stock may require shifting to fresher spots or warmer faces. Crossbreds, if they have had a rigorous winter, are inclined to get dull and hang in hungry corners where feed may be dirty and scarce, or on

dark faces. If they are not seen to now an unpleasant time is in store as the season goes on, picking up sheep cast from weakness, skinning and plucking dead wool, till the stock gradually improve with the growth of feed, while at shearing-time the amount of heavily matted wool will denote the hard existence these sheep may have experienced. Other stock work will consist of shifting breaks on turnips, and taking off ewes in lamb and putting them in clean paddocks.

There is also always plenty to do looking round and repairing fences, getting young horses broken in, &c. Swamps and low-lying rough places dry enough to burn should have a match put to them this month. Rabbit-poisoning we find most effective in August and September, using phosphorized pollard,* and no opportunity must be missed, as, owing to the scarcity of feed, the rabbits generally take it well. Strychnined oats are also coming into vogue, and this method has recently given some great results.

SEPTEMBER.

September is a very full month. Oat-sowing should be completed and ground worked up for early turnips and grass. Sheep will be requiring more attention as they get heavier in lamb, being more apt to cast. They should therefore be quietly gone through, and not disturbed more than necessary. However, the shepherd on his rounds will find that ewes heavy in lamb will be inclined to hang too much on lower ground, such as river-flats, and will be more liable to cast as they get weaker through eating each other out and dirtying the ground. On clean, fresh, healthy slopes they will be found to cast less, and are stronger. Stud ewes will be lambing this month, and need much attention. Unless the ewes have been well fed they will have little or no milk when the lambs are born. Too much old grass or dry food may produce a like effect. On the other hand, if the ewes have been too well done on turnips or other special feed, milk troubles may arise, such as inflammation of the udder, which may cause death or a diseased quarter.

If possible, the ewes should be lambed on a clean, fresh paddock. When lambing has started the shepherd should visit the ewes in the morning, as then is the time they may be in trouble and assistance required. Another round should be made at midday, and also near night-time. The shepherd on studs or other paddock ewes lambing should never have more than one dog following him—and that a quiet one which will remain with the horse when he is not wanted—as a ewe at sight of a dog will often clear out and leave her lamb. A few hurdles should also be kept handy to whip up a pen in which to put an obstinate ewe that may refuse to take her lamb, or to mother a motherless lamb on to a ewe that may have lost her lamb. When the lambs are a few days old it is a good plan to work them off with their dams into another paddock, thus giving a better opportunity to look after the ewes still

* One of Southland's best pastoral properties, some years ago a perfect rabbit-warren, has been cleared of rabbits simply by the consistent use of phosphorized pollard, poisoning every six weeks until they were put down. Southland can always rely on a rabbit-supply while trapping remains in existence, and while there is a lack of neighbours combining to poison together when weather conditions are favourable. The formation of Rabbit Boards in rabbity districts would certainly tend to enforce combined efforts against the rabbit nuisance.

to lamb. Fences and marking-yards should be seen to, and overhauled if necessary. When marking-time arrives it will be found that ewes and lambs will yard up better if the yards have been set up with an uphill entrance.

Any old tussock country that requires freshening up should be burned this month and no later, as afterwards the tussock-roots may get too dry and frost or dry weather kill the roots. Surface sowing should be carried out on the burned ground straight away, as the ashes may help to cover and germinate the seed better, and also as this is the best period for surface sowing. Fences that may require trimming, such as gorse, should now be cut; and no time should be lost in completing any tree-planting decided upon. Sowing the homestead garden with the season's main requirements of vegetables may also be mentioned.

OCTOBER.

Although October may come in spring-like, it is to be considered the most treacherous month of the year, liable to have as cold and stormy weather as in the winter. There may be a fair growth of feed in the paddocks, but not until November is there much spring in the feed on the pastoral country. Lambing of hill ewes usually starts about the second or third week of this month, and plenty of looking-round without disturbing the ewes is necessary. Good healthy hill ewes that have never seen turnips seldom need any assistance in lambing. Hoggets will need more looking-round, as they will be getting heavier in the wool and more liable to cast. The shepherd should always carry a sack on the saddle, to gather dead wool or skins to some convenient spot from which later they may be brought in. Breeding-cows, which will have been moved in to some place where they may be seen, will also be calving this month, and should be watched daily. Any ewes, such as studs, that have lambed during September will now have lambs ready to mark. A disinfectant dressing should always be used when marking paddock lambs, as there is always more risk of blood-poisoning than with the lambs marked out on tussock country.

If some pollard poison is distributed about rabbity spots (patch poisoning), a good number of young rabbits or runners will get tripped up—given favourable weather. This will help to keep the number down and save feed. In team work there is the carting of seeds, manures, stores, and woolpacks. Intended crops of turnips, also grass, should now be sown.

NOVEMBER.

With November the lambing will be getting well over, and towards the end of the month the run or tussock-bred lambs will be ready to mark. These ewes and lambs should be mustered in cuts or small mobs to marking-yards temporarily erected in their own locality. Under this method after the marking is over and the lambs released the ewes will pick up their lambs quicker, especially if they have been carefully handled into the yard. After marking, the lambs should be held for a while, and then quietly turned in to assist in mothering up. This is a good month for doing any early shearing of rams, ram hoggets, studs, wethers, or hoggets that may have been turniped. Before shearing, the shed should be thoroughly cleaned and disinfected, and this operation should

also be carried out at least once a week during shearing. Teams will be busy working up ground and sowing swedes or hard turnips, ridging being much preferable to drilling on the flat, owing to the increased bulk of feed yielded.

DECEMBER.

Lamb-marking being completed, December usually finds the musterers away getting in the hoggets off tussock country for shearing, also other dry sheep—maiden ewes and wethers. When brought in, after being drafted and strangers taken out and separated, the sheep will be placed in blocks or paddocks handy to fetch into the shed for shearing. About the middle of the month shearers and shed hands roll up, and soon the busy period of shearing gets into full swing. Shearers will have rigged their stands, and are ready with either blades or machines, as the case may be. The classer and his assistants, the wool-rollers, will be busy seeing that the bins are ready, while the pressers will have the press ready and packs and twine handy. While the dry sheep are being shorn the musterers will be away bringing in the wet ewes, also perhaps taking out shorn sheep and placing them on the summer country, usually the highest and farthest out.

With favourable weather the shearing does not last long, and it is all the better for the sheep if they are placed back as soon as possible on their grazing-country. However, shelter for newly shorn sheep—either by blades or machines—must not be overlooked. Nothing is more advantageous than a good plantation securely fenced.* With the teams this is a busy month, hastening along with the turnip-sowing. Hay will also be cut, if available, and made secure.

* I have found the plantations at Mount Linton of much benefit on many an occasion when bad storms have broken out during the shearing, and my thanks are due to the former owner, Mr. Reginald Mackinnon, for his foresight in this matter. There is far too little tree-planting being done these days.

True Breeding of Plant Races.—In my last article dealing with montane tussock-grassland, published in the June number of the *Journal*, there occurs, in the third line from the bottom of page 340, an unfortunate printer's error, "tree-breeding races" of tutu appearing instead of "true-breeding races." This term "true-breeding" is one of fundamental importance, as every farmer must know. A plant may produce offspring of a uniform character, all the individuals closely resembling the parent; or, it may produce offspring far from uniform, with few or no individuals closely resembling the parent. In the former case the plant is said to be "true-breeding," or "to come true from seed"; while in the latter case it is said "not to come true from seed." It is obviously most important to know whether a plant comes true from seed, or the contrary. In nature, there are many true-breeding races, but the outer aspect of a plant generally tells nothing in this regard; while the breeding true of wild races, or species of plants, is nearly always a matter of supposition and not known for certain. Certain knowledge, indeed, can only be gained by rigidly conducted experiments where all sources of error are excluded.—*L. Cockayne.*

MILKING-SHED DRAINAGE.

A DAIRY-FARMER'S GOOD SYSTEM.

J. R. CURLE, Dairy Instructor, Palmerston North.

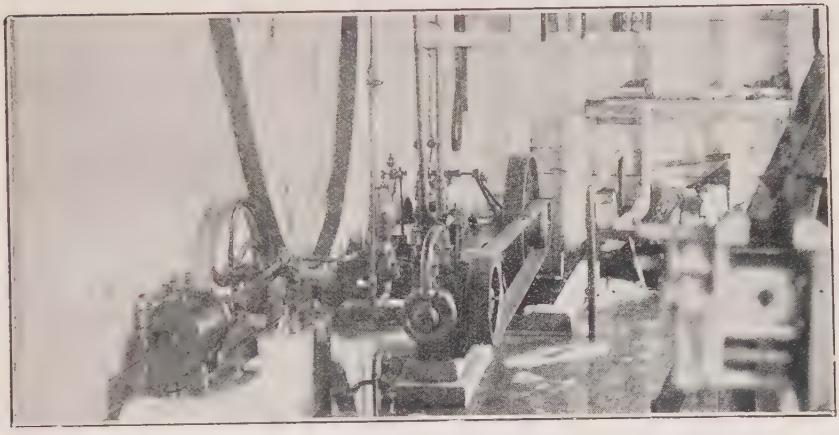
THE methods practised on large numbers of our dairy farms for dealing with the manure and drainage from the cow-shed and yard are very far from being either satisfactory or sanitary. Notwithstanding all that has been published proving the value of the manure—both solid and liquid—if properly used, it is still all too usual to find that a shovel or hoe, and sometimes a broom, to get the dirt pushed through the stockyard fence is all that is considered necessary. Here the manure is left, to be trodden over by the stock, blown about by the wind, and worked up into a fermenting puddle by the rain, causing a nuisance and a sure source of contamination to the milk, which is usually kept somewhere in the vicinity overnight.

A visit to the farm of Mr. D. Bell, Nireaha, Eketahuna, to view the means used there for dealing in a sanitary and satisfactory manner with the cow-yard drainage would afford an object-lesson to a large number of our dairy-farmers. The shed, built on the ordinary run-through plan, is a picture of neatness, nicely painted, with all plant and appliances in shining condition. Neither the shed nor yard has any drainage proper. The floor is laid with a fall to one corner of the yard. Just outside the yard at this corner there is sunk into the ground a cylindrical iron tank—in this case an old digester from a boiling-down works—of about 500 gallons capacity, with a small aperture on the top, which can be made airtight, the same as a sludge-door on a steam boiler. Into this tank are fitted two pipes. One pipe of 2½ in. diameter goes to within a few inches of the bottom, where it branches in three directions, and reaches about 9 ft. or 10 ft. in the air, with a bend and short length of pipe and tap, high enough for a dray loaded with a 400-gallon iron tank to stand underneath. The other pipe is a ¾ in. one, connected to the tank from an air-compressor in the engine-room. The milking-machine vacuum pump would serve the same purpose, the exhaust being connected with the tank.

All manure from the shed and yard, both solid and liquid, together with the water (of which there is a plentiful supply) used in washing down, is run into this tank through the small aperture on the top, the solids being broken up before entering the tank by passing through a strainer made of three or four pieces of stout fencing-wire.

When the tank is about three-parts full—say, twice a week—the aperture is closed, and the air-compressor used to put a 12 lb. pressure in the tank. The 400-gallon tank on the dray is then put under the tap on the 2½ in. pipe and the tap opened, when the whole contents of the underground tank are forced by the air-pressure exerted up this pipe and into the tank ready to be carted away. The tank has two

MR. BELL'S MILKING-SHED AND YARD AT NIREAHA.



VIEW IN ENGINE-ROOM, SHOWING COMPRESSOR (IN CENTRE).

FILLING TANK ON DRAY FROM THE DRAINAGE-TANK.

plug-holes in the back, and when at the field to be manured the plugs are drawn, and the manure distributed just where required.

This system ensures good use being made of the cow-yard drainage, besides keeping the whole surroundings of the milking-shed in a clean and sanitary state.

A NOTE ON ASPARAGUS-CULTURE.

W. H. TAYLOR, Horticulturist.

For some years past the writer has advocated the culture of asparagus on modern lines. By this is meant the elimination of beds, and setting the plants in rows at much greater distances apart than is the custom under the bed method. In old times an asparagus-bed was an institution, almost an heirloom. Comparatively large sums were expended on the preparation of a bed—removal of the subsoil and substitution of top soil and providing large quantities of manure and other material. There is in consequence a widespread idea that the culture of this vegetable is very costly, and that it can be regarded only as a luxury to be indulged in by wealthy people. It is a fact, however, that English market-gardeners give it field culture and do most of the work with the plough, very considerable areas being so planted in England.

The present note was suggested by an item appearing in a recent issue of the *Monthly Newsletter*, issued by the Washington State Department of Agriculture (U.S.A.). The State is divided into ten horticultural districts, and in each there is a horticultural inspector. Each of these furnishes monthly reports on produce sent from his district, particulars of which are published in the *Monthly Newsletter*. In the report from District No. 1, Snake River, Walla Walla Valley, the following particulars are given of car-loads of produce shipped: Onions, 616; cabbage, 27; asparagus, 25; spinach, 28; rhubarb, 60. This makes interesting reading, and one wonders what New Zealand market-gardeners would think of it—asparagus almost equal in car-load bulk to cabbage, and, of course, much in excess as regards weight, and spinach topping both. The large bulk of onions is, of course, not more than would be expected; it merely shows that vegetable to be esteemed as it is with us. The fact stands out that the Americans pay far more attention to asparagus and spinach—both of high diuretic value—than to cabbages. It is patent that they would not do so unless it paid. To make it pay they must adopt modern methods in asparagus-culture.

Asparagus comes in early spring when vegetables are scarce and high in price, therefore fair prices are certain. Field culture produces much larger heads than are obtained by the bed method, which means cheaper handling and higher values. It is not to be supposed that any soil will grow asparagus. First-class soil is required, but given this the culture involves comparatively little labour, and there are no special diseases or pests to deal with. My opinion is that many of our small farmers would find asparagus a profitable crop.

PIG BREEDS AND BREEDING FOR NEW ZEALAND REQUIREMENTS.

K. W. GORRINGE, Instructor in Swine Husbandry.

THE commercial conditions affecting pig-raising in New Zealand seem to indicate a greater demand for bacon, with a lesser demand for pork. In dealing here with the subject of breeds more attention will therefore be given to those breeds most suitable for bacon-production. It is, however, not my intention to decry any particular breed which we have at the present time in the Dominion, but to show where a more profitable return can be obtained by using only those breeds which are most suitable for New Zealand requirements. There is no doubt that the time has arrived for our farmers to seriously take in hand the production of pigs on more scientific and up-to-date lines, as adopted by the leading countries in swine husbandry.

PRINCIPAL BREEDS IN NEW ZEALAND.

The principal breeds represented in New Zealand will now be considered in respect to their qualities and merits for bacon or pork production.

The Berkshire.—This breed is recognized all over the world as very nearly perfect, and in New Zealand it is undoubtedly the most popular one at the present time. This may be attributed to the facility with which it has become acclimatized, and to the high returns it provides for bacon and pork, to its great muscular power, vitality, and constitution, and its marked tendency to resist disease. As an all-round good pig for the farmer it occupies first place. From the bacon-curer's point of view, however, the Berkshire has two drawbacks: it does not possess the proper length of flitch or sides, also it is too thick in the shoulder.

The Middle Yorkshire.—This breed is used extensively here, and can be claimed as second favourite among farmers. It is noted for quickness of growth, early maturity, a good appetite, a hardy constitution, a good coat of hair, and little liability to scald; while it is also a good grazer, feeding and fattening well at any age. The breed may be classed as the most contented, tractable, and readily handled of all pigs. The sows have a good flow of milk and are excellent mothers. The same remark must be made about this breed as for the Berkshire—namely, that it does not possess the length of flitch and is rather thick in the shoulder for bacon, but it makes excellent pork.

The Small Yorkshire.—This breed is not very much kept in New Zealand, and is limited to producers of small porkers. Butchers realize the superiority of the breed as porkers, and do not hesitate to cater for their customers' demands. The short limbs, model forms, and docile disposition are constantly present to the observer, as well as

early growth and a greater capacity to assimilate a maximum of food-constituents which go to make flesh than other classes of pigs. Moreover, their vigorous digestive power is credited with producing a pound of pork at the lowest cost in comparison with other breeds. The easy, even temper and tractable disposition of the Small Yorkshire is great, and will account for its early maturity. Quality supersedes size. The breed is not so good for bacon, and should be used exclusively for pork-production.

The Devon (Large Black).—This breed is fairly well distributed in the Dominion. The Devons have a very contented and happy disposition. It is claimed that the natural carriage of the ears extending over the eyes has produced this, and renders them especially suited for grazing. The breed is also noted for the whiteness and firmness of its fat and abundance of well-streaked lean flesh. The sows make excellent mothers, and the length and depth of carcase provides capacity for large litters, which will range from eight to fourteen each. The sows have well-formed udders, together with a rich supply of milk. The peculiar merit of the breed is their usefulness to the farmer, owing to their ability to live and grow on any class of food, grass, refuse, or vegetables, and readiness to be topped off for bacon at a short notice. But while the breed is specially suitable for bacon in the country where it originated, in my opinion it is not suited for New Zealand conditions on account of its large size; when properly fattened it is too heavy for our requirements.

The Tamworth.—The demand for leaner bacon during the past twenty years has been a great factor in bringing the Tamworth breed into prominence and displacing some of the more refined breeds. The natural stamina, prolificness, and grazing-capacity of the Tamworths, combined with the great delicacy, firmness, and succulence of their flesh for bacon, commend them to the farmer in this country, where pasturage and open grazing are abundant. All doubts as to the Tamworth retaining its qualifications in this climate may be fairly set at rest. This has been amply confirmed by experience. The breed has the reputation of being slow in maturing, but such has not been my experience in New Zealand. Evidently the nature of the climate has produced a reaction towards quick maturity, and in experiments carried out by me the Tamworth has more than held its own with other breeds. Certainly the animals are not handsome, and a first inspection is liable to create a prejudice against them. This, however, is soon got rid of by becoming familiar with their good points in the paddock, at the farrowing-stage, and for the curing-house. Where they have also proved valuable is in crossing with other breeds and further imparting vigour, size, and prolificness to overrefined pure breeds. The progeny of such crosses produces an excellent quality of flesh at a low cost. Tamworth sows are good mothers and free sucklers. A feature specially worthy of record in their favour is their power to resist disease. They are also noteworthy for the facility with which they farrow, and the small trouble they have in rearing large litters. Again, Tamworths have acquired a reputation for docility. They are easily managed, and do not show any disposition to be ill-tempered. My motive for dwelling a little longer on the Tamworth than the other breeds is to emphasize the advisability of paying more attention to the former for crossing purposes.

Other Breeds.—We have also one or two other breeds in New Zealand which to my knowledge have not many qualifications to recommend them to breeders in preference to those mentioned.

BREEDING FOR PORK OR BACON.

In summing up, the question arises, which are the best commercial breeds suitable for New Zealand conditions (1) to breed for pork, and (2) to breed for bacon? In answering I am guided to a certain degree by experiments carried out in America and Britain, but mainly by my own practical experience of thirty years in the Dominion.

As regards breeding for pork, I have come to the conclusion that any of the smaller breeds fulfil the requirements—namely, the Small Yorkshire, the Middle Yorkshire, and the Berkshire.

In breeding for bacon, however, more attention should be given to the growing of pigs most suitable to the demands of the consumer and bacon-curer. What are these demands? In this country we have a standard weight for bacon pigs ranging from 110 lb. to 150 lb. dead-weight. The bacon-curer tells us that the greatest demand is for about 140 lb. net; therefore, with this standard set, it is not wise for farmers to grow others, unless required for home consumption only. The same conditions apply equally for export. Then, again, the curer demands a pig with long "flitches" or sides for rolled bacon. He finds it impossible to roll bacon out of a short-sided pig. In fact, he declares that all the breeds except two—the Tamworth and the Devon—fall short of the required length.

To meet the position we must breed a pig to satisfy all requirements. This is where the Tamworth comes in. By itself it is not suitable, but by using it to cross with the Berkshire and Yorkshire it is of extreme value.

THE TAMWORTH CROSS.

In breeding for the first cross it is better to use a Tamworth boar with Berkshire or Yorkshire sows. Some advise the other way round—a Tamworth sow with a Berkshire or Yorkshire boar. My own experiments, and my opinion based on the best authorities on pig-breeding, are in favour of the former practice. The result of this cross is very favourable, and gives a splendid line of red-and-black-spotted pigs, every one almost alike. The pigs make good baconers, but a further improvement can be made by selecting the sow pigs out of this litter and crossing them back to Berkshire or Yorkshire boars. Of course, the colours will be different on the Yorkshire sow. By the latter cross one obtains what is regarded as the ideal bacon pig—that is, three parts Berkshire or Yorkshire and one part Tamworth. This pig will be raised and fattened for the curer six weeks earlier than any purebred pig. Experiments have proved this without a doubt, and the saving of six weeks' extra food is worthy of consideration. The crossbred sows are the very best that the average farmer can have anything to do with. Combining as they do all the good qualities of both breeds, they are more active—standing higher—and make the most careful of mothers. The Devon has also been used for crossing with the Berkshire and Yorkshire, but, in my opinion, not with such good results. From experience I have found that the Devon has nothing like the robust constitution of the Tamworth, and it is most

essential that constitution be one of the chief aims in mating or crossing for any purpose.

Farmers who live within a short distance of each other, wishing to adopt this system of crossbreeding for bacon, may think that it would hardly pay to buy a Tamworth boar for one or two sows. They could, however, adopt the plan of having a boar on the co-operative system—say, between six or eight—and perhaps then pass it on to another group to use at a certain fee, or follow any other plan which they can arrange between themselves. The co-operative method would work well with some farmers, but with others who do not look after their pigs well it might, of course, not be advisable.

CONCLUSION.

In the vocation of pig-raising breeding is the bedrock of success, irrespective of type. It is clearer now than ever it was that if pigs are worth keeping at all we must pay due regard to their breeding and individual qualities. Pedigree stock are available, and are steadily increasing in numbers and character; their influence is wholly for good. Therefore farmers considering different breeds to choose from must be guided by the surrounding conditions of food, housing, and the class of trade they purpose to cater for.

CONTROL OF BROWN-ROT ON PEACHES.

THE PAST SEASON'S EXPERIMENTS AT ARATAKI.

T. E. RODDA, Manager of the Arataki Horticultural Station.

I. SPRAYING TESTS.

FURTHER experiments were carried out at Arataki during the past season to ascertain if it is possible to control brown-rot on peaches by the agency of any of the recognized fungicidal sprays, applied systematically. The scheme adopted was the same as that carried out during the season 1918–19,* excepting that the trees in a few rows and the ground beneath them were sprayed with sulphate-of-iron and sulphuric-acid solution. This solution was applied during August when the trees were quite dormant. The trees were pruned in the same manner as during the previous year—that is, every alternate tree in each row was treated in the ordinary way by shortening in all the leaders and cutting back all the laterals of any length; the remainder were treated by thinning out wood only; no leaders or laterals were stopped or shortened in. All prunings were carefully raked up and burned. The soil was given a dressing of 6 cwt. per acre of carbonate of lime and ploughed during the middle of August. All the strips that could not be reached by the plough were turned over by the spade. The weather conditions right throughout the test were extremely dry. The different spraying-specifics were applied according to the times and periods laid down in the prearranged plan.

*See *Journal*, May, 1919, page 272.

Practically no brown-rot appeared right up to the time of picking and packing. The highest percentage of infection in any of the plots was considerably below the decimal point. In some of the plots no rot was recorded for the season.

Effects of the different Specifics on Fruit and Foliage.

Lime-sulphur: A locally made lime-sulphur called "Calsulph" was used during the season. It scorched the tender tips and caused the leaves to fall slightly on twenty-three different varieties. The foliage on the other varieties treated with this same lime-sulphur remained normal right throughout the season.

Self-boiled lime-sulphur: A supply of lime was obtained from Te Kuiti for making this preparation. It was a very good quality of lime without any trace of sand. No injury to any of the fruit or foliage was caused by its use; moreover, it had extremely adhesive qualities, a thick deposit showing on the leaves for some considerable time.

Atomic sulphur: As stated in my last year's report, this specific did not injure fruit or foliage in any way.

Sulphur atoms: This preparation appeared to have exactly the same action on fruit and foliage as atomic sulphur.

Sulphate-of-iron and sulphuric-acid solution: This solution did not injure the trees in any way, but it apparently did not produce any different results as compared with the trees that were not sprayed with it.

Summary.

As far as the eye could detect brown-rot was non-existent in the fruit at time of picking, but I am of the opinion that the results were not brought about by the sprays used. I believe that the extremely dry weather was the controlling factor. My opinion in regard to this point has been greatly strengthened by the fact that in some of the adjoining private orchards, where no attempt had been made at control, there was no sign of the disease.

2. CONTROL AFTER PICKING AND DURING TRANSIT.

In the experiments conducted last year it was observed that in numerous instances fruit that had shown no indication of brown-rot at time of picking and packing was badly diseased when opened up in Wellington three days later. In one instance the fruit in a case had developed 29 per cent. of rot.

To test the practicability of dipping and fumigating peaches, after picking, with various compounds against the development of the disease in transit, comprehensive tests were conducted at Arataki this past season. While the results on disease-control were very inconclusive, on the other hand reliable and useful information was obtained of the effect of the treatments on the fruit. A line of treatment was laid down to ascertain if treating either by fumigating or dipping just previous to packing would have any good results. The difficulty at the outset, however, was to ascertain to what strengths the fruit would stand the various gases and dips. Five different pickings were made, and the treatments adjusted according to the effect on the fruit. The packing-benches, fruit-house, and picking-bags were treated with formalin, 1–100, prior to each picking; and the packer's hands were washed in

formalin, 1–100, and then well rinsed in clean water before and after handling and packing the fruit included in each individual treatment, so as to guard against the danger of the chemical on the fruit in one box being affected by that in another case.

The following is a condensed report on the various treatments :—

Dipping.

The fruit was dipped in the various solutions by placing in a scrim bag and allowing it to remain immersed for one minute. It was then placed on a sack that had been dipped in the same solution, and allowed to remain until it was nearly dry before packing. The cases and lids were also dipped in the same solution with which the fruit they were intended to contain had been treated.

Bluestone : At a strength of 1 lb. to 10 gallons and 1 lb. to 20 gallons the fruit was badly marked and not fit for sale, but when reduced to 1 lb. to 40 gallons the solution did not mark the fruit, and apparently the flavour was quite unaffected.

Lime-sulphur : When used at 1 gallon to 30 gallons very little deposit was noticeable, and the taste of lime-sulphur could not be detected on the fruit, even when it was not wiped. At a strength of 1–15 it left too heavy a deposit on the fruit.

Formalin : At a strength of 1 gallon to 100 gallons no markings were noticeable on the fruit, and it apparently did not affect the flavour. When used at 1–50 the fruit was badly marked, making it quite unsaleable.

Permanganate of potash : This was quite safe on fruit at a strength of 2 drams to 1 gallon of water.

Quick-kill : This is a compound manufactured in Auckland, and was used according to directions of 1 lb. to 25 gallons of water. Treatment did not affect the appearance of the fruit, but a slight bitterness was detected.

Dusting.

Bordeaux powder : This caused the fruit to sweat, and as a result the powder became partly dissolved, making the fruit very unsightly. Treatment a failure.

Flowers of sulphur : Even when a small quantity was used the grains were very noticeable on the fruit. It also had the effect of hastening ripening.

Talmard's lime-sulphur powder : This was like flour on the fruit, and could not be readily wiped off.

Fumigation.

For the purpose of fumigating and vaporizing, a fumigator of 100 cubic feet capacity was constructed. The sulphur was burned by placing on a few live coals in a brazier inside the chamber. The formalin and permanganate of potash were evaporated by boiling over a kerosene-lamp inside the chamber. For the purpose of spraying with a fine mist a hole was bored in the side of the chamber to insert the nozzle, which under high pressure gave a very fine misty spray. All fruit treated inside the fumigator was placed in cases, but not packed

before being placed in the chamber. Packing and wrapping were done after taking out of chamber.

Flowers of sulphur: Treatment was quite a failure. Even when used at a strength of $\frac{1}{4}$ oz. to 100 cubic feet for fifteen minutes it marked the fruit very badly.

Formalin: When used at a strength of 2 fluid ounces in 100 cubic feet it had almost the same effect on the fruit as flowers of sulphur. When $\frac{1}{2}$ fluid ounce was evaporated in 100 cubic feet the results were decidedly better in three consignments treated, but the skin of the fruit in one lot was rather much scorched.

Permanganate of potash: This did not affect the fruit in any way when 2 fluid ounces at a strength of 4 drams to 1 gallon were evaporated in 100 cubic feet for thirty minutes.

Mist spray: The practicability of spraying the walls of a confined chamber with a very fine mist spray and allowing the fumes to evaporate was tried, but the treatment was abandoned, as it was not considered practicable to undertake the work on a commercial scale.

Picking and Packing.

As the fruit was picked it was graded into two lots for maturity. Well coloured and matured fruit represented one grade, while matured but poorly coloured fruit represented the other grade. The whole scheme was duplicated on fruit representing the two stages of maturity, picked and treated at the same time. In connection with picking, wrapping fruit against non-wrapping was tried.

Summary.

The fruit was treated and despatched to the headquarters of the Horticulture Division, at Wellington, for observation and report. Untreated check cases were sent forward with each lot. The fruit was examined on arrival, and a record taken of its condition. It was re-examined every second day, and the fruit as it ripened and became fit for immediate retail sale was taken out of the cases. A record was taken of the remainder as it ripened.

In the first three lots very little brown-rot developed after treatment, but the percentage of rot that developed in the fourth picking varied, and was the highest recorded in the trials. This lot was received on a Saturday, and was not opened till the Monday. The weather at the time of picking and during transit of that consignment was very warm and muggy. Probably such weather conditions were extremely favourable for the development of the disease, or possibly the variety under treatment might have been a more responsive host than the varieties previously treated. The delay in examination would also tend to increase the amount of infection.

A good deal of valuable information has been gained regarding the strength at which the various antiseptic compounds can be used. From the point of view of disease-control in transit the experiments were rather disappointing. No marked difference between any of the treatments was noted, but one remarkable feature in the consignment that developed the most disease was the fact that the untreated fruits were the freest from brown-rot.

QUALITY OF ARTIFICIAL FERTILIZERS.

ACTION REGARDING "RADIO MANURE."

As administrator of the Fertilizers Act the Department of Agriculture has the function of watching over the interests of users of artificial manures. The Act provides that every vendor of fertilizers shall register his name and address with the Director-General of Agriculture once a year, on or before 1st July. Before offering any fertilizer for sale the vendor must register its composition, but this information may be supplied at any time before the sale. An invoice certificate corresponding to the information on the registration form must be supplied to every purchaser of 5 cwt. or upwards of fertilizer. Samples of fertilizers are liable to be officially drawn and analysed.

The case here dealt with—that of "Radio manure," manufactured by Radio Manures Limited, Auckland—is given publicity in the *Journal* for the information of farmers and others. It will be noticed that in the legal proceedings the defendant vendor was not the manufacturer of the manure, but a trading firm. While the good faith of the latter is not questioned, the necessity is shown for greater care on the part of distributing merchants.

COURT PROCEEDINGS.

Following is a brief report of the Court case in question :—

At the Magistrate's Court, Marton, on 13th May last, before Mr. J. L. Stout, S.M., Mr. C. H. Schwass, Inspector under the Fertilizers Act (for whom Mr. Izard appeared), proceeded against the branch manager of a well-known North Island commercial firm on the charge of having sold a fertilizer (Radio manure) the analysis of which differed from the defendant's invoice certificate, to the prejudice of the purchaser. Defendant pleaded not guilty.

Mr. Ladley, for defendant, raised the preliminary objection that the information should have been against the defendant's company and not against the defendant personally. His Worship noted the objection for consideration.

Mr. F. T. Leighton, Analyst under the Fertilizers Act, gave evidence as to the composition of the sample. The deficiency in phosphoric anhydride amounted to 0·95 per cent., or approximately one-fifth of the amount guaranteed to be present. The value of the deficiency would be about £1 5s. per ton of the mixture, calculated from the unit values. The sample was a low-grade fertilizer, of which the greater portion consisted of coal-dust, the balance being essentially lime and phosphate. The current value of the fertilizing ingredients would be about £4 5s. per ton of the mixture.

Defendant in evidence stated that the fertilizer had been sold in good faith under warranty. Since he had notified the manufacturers of the result of the Department's analysis he had received from them an amended invoice certificate showing a lower analysis. After the Inspector had taken samples witness issued instructions that no more

Radio manure was to be sold, pending the result of the Department's examination. The firm's profit on Radio manure was about 12s. 6d. per ton.

Judgment was reserved. Giving reserved judgment at Marton, on 27th May, His Worship said that he thought Mr. Ladley's objection must be sustained. Defendant was only the servant of the company. The information would therefore be dismissed.

FIELD MANURIAL TRIAL WITH SWEDES AT STRATFORD MODEL DAIRY FARM.

Plot 5 (on right), bone, slag, and super. Plot 6 (in centre), Radio manure. Plot 7 (on left), basic super and blood. Showing contrast in general growth.

SWEDES FROM EQUAL AREAS ON PLOTS 5 (RIGHT), 6 (CENTRE), AND 7 (LEFT), SHOWING CONTRAST IN ROOT-YIELD.

(The middle heap is from the Radio-manure plot.)

FIELD TESTS WITH RADIO MANURE.

Mr. J. W. Deem, Fields Instructor and Supervisor of Subsidized Demonstration Farms, Wanganui, supplies the following account of tests made by him with Radio manure :—

Early last year a manure called "Radio" was brought under my notice and recommended as a substitute for basic slag. On going into

the analysis I found that it was very low in plant-food, containing a total of only 4·98 of phosphoric acid (4·72 of which was insoluble) and 0·66 of total nitrogen. To make up for this deficiency it was stated that the manure had gone through some special treatment, and it was suggested that it contained an unusual amount of radium.* It being the recognized practice to value manures according to the plant-food shown on the analysis, the price asked for Radio—£9 7s. 6d. per ton—seemed to be a great deal above its value as compared with other manures on the market. Calculating the unit values from the selling-price, these were found to be, on the vendor's analysis, £3 16s. per unit for nitrogen (present average price £1 15s.), and £1 7s. per unit for phosphoric anhydride (present average price 12s. 6d.). The cost of the two fertilizer ingredients in Radio was therefore more than double that of the same ingredients in standard fertilizers at the same period.

The low content of plant-food in Radio as shown by the analysis and the high price per unit, coupled with the statement that it possessed some special qualities, suggested a field trial. I therefore purchased a quantity of Radio from one of the registered vendors, and selected a maiden field on the Stratford Model Dairy Farm which had just been stumped and ploughed for the first time, and decided to test it against standard manures in the growing of a swede crop. My reason for selecting this field was the necessity of having maiden land free from the influence of previous manures, in order to scientifically test the value of different fertilizers.

The following tables of results, together with the photographs (on the preceding page), speak for themselves :—

TABLE I.—FIELD MANURIAL TRIAL WITH SWEDES.

Sown 12/12/19, at 10 oz. per acre, through every second coulter; no after-cultivation; maiden land. Weighed 12/5/20. Variety, Hurst's Monarch.

Manure.	Rate per Acre.	Yield per Acre.	Cost of Manure.	Percentage of Rot.	Remarks.
	Cwt.	Tons cwt. lb.	s. d.		
1. Basic superphosphate	3	40 3 64	29 3	12·0	Medium top, nice bulb.
2. Basic slag	3	36 12 96	31 6	15·0	Not quite so good.
3. Ephos phosphate ..	3	40 13 24	27 9	12·0	Heavier tops.
4. Bone, slag, and basic super, equal parts	3	40 3 64	34 9	8·0	Top growth not so heavy.
5. Bone, slag, and super, equal parts	3	39 13 104	34 9	8·0	Similar to above.
6. Radio manure ..	3	20 14 72	28 1	15·0	Tops poor, roots small.
7. Basic super 6 parts, dried blood 1 part	3½	36 9 72	36 2	20·0	Medium tops, roots fair.
8. Ephos 3 parts, super 1 part	3	41 2 96	28 1	12·0	Heavier top growth.

* Any value this manure may have as a fertilizer is certainly not due to radio-active ingredients, which are present in less quantities than those of ordinary Wellington soil. [Note by the Department's Chemist.]

TABLE 2.—MANURIAL TRIAL WITH SWEDES.

Small plots sown 15/12/19; drills 22 in. apart; thinned and hand-hoed once; maiden land. Variety, Sutton's Best of All.

Manure.	Rate per Acre.	Yield per Acre.	Percentage of Rot.	Remarks.
	Cwt.	Tons cwt. lb.		
1. Radio manure.. ..	3	17 7 16	14·0	Poor tops, roots small.
2. Control	Nil	17 7 16	22·7	Poor tops, roots small.
3. [illegible] 1 part	[illegible]	[illegible]	[illegible]	Tops better, fair roots.
4. Ephos 2 parts, super 1 part	3	28 18 64	18·5	Good tops, fair roots.
5. Basic super	3	29 11 48	7·0	Nice roots.
6. Basic super 6 parts, blood 1 part	3½	30 4 32	16·0	Nice roots, tops heavier.
7. Bone, slag, and basic super, equal parts	3	30 17 16	12·0	Nice even roots.
8. Ephos	3	28 5 80	12·0	Fair roots.
9. Walpole guano ..	3	23 15 80	10·3	Rather small.
10. Surprise guano ..	3	25 14 32	12·0	Rather small.
11. Basic slag	3	27 12 96	25·0	Fairly even.
12. Super	3	24 8 64	22·2	Rather poor.

FRUIT VARIETIES FOR EXPORT AND LOCAL MARKETS.

THE 1920 CONFERENCE.

J. A. CAMPBELL, Assistant Director of the Horticulture Division.

THE second conference representing the New Zealand Fruitgrowers' Federation, the New Zealand Association of Nurserymen, and the Horticulture Division, convened by the Department of Agriculture for the purpose of considering and recommending varieties of fruit-trees for future planting, was held at the Farmers' Institute building, Wellington, on 29th May last. The delegates were as follows:—

Fruitgrowers: T. W. Atwood, Auckland; A. M. Robertson, Hawke's Bay; T. C. Scott, Nelson; S. I. Fitch, Canterbury; J. D. Bennetts, Otago.

Nurserymen: G. A. Green, Auckland; A. E. Morrison, Warkworth; T. Horton, Hastings; T. Waugh, Wellington; E. Ivory, jun., Rangiora.

Departmental Officers: T. W. Kirk, Director of the Horticulture Division (Chairman); J. A. Campbell, Assistant Director of the Horticulture Division (Vice-Chairman); G. Esam, Orchard Instructor, Wellington; L. Paynter, Orchard Instructor, Waikato; W. C. Hyde, Orchard Instructor, Nelson; W. T. Goodwin, Orchard Instructor, Motueka; J. H. Thorp, Orchard Instructor, Otago.

The objects of the conference were to consider the report issued by the 1916 conference,* and to make recommendations and amendments thereto suggested by subsequent experience as being in the interests of the future development of the fruit industry; further, to consider new varieties of fruit, including those recommended by the previous conference for further testing, and to bring under notice any varieties of promise which may have made their appearance in the meantime.

These matters were carefully considered, but the apple, owing to the dominant position it holds in relation to the fruit industry of the Dominion, called for and received special consideration. Although few alterations were made in the previous lists recommended for planting, the conference particularly wished to emphasize the following points :—

(1.) Owing to the heavy planting of apples since 1909 the success of the fruit industry is almost entirely dependent on the establishment of a reliable apple-export trade, particularly with the Northern Hemisphere, and all subsequent apple-planting and reworking of trees should be done with this in view.

(2.) Notwithstanding the fact that early shipments to the Northern Hemisphere are desirable, heavy planting of such early varieties is not recommended in the meantime other than in districts where a reasonable local market price is assured. This might appear to be a reversal of policy regarding such varieties, but this is not intended. The conference, having regard for the very moderate keeping-qualities of such varieties and the very poor price they command on the local market, merely advises marking time with respect to them until those already planted have sufficiently matured to allow of trial shipments to Europe being made, leaving the results of such shipments to determine the case for or against further planting.

(3.) Although the variety list for local markets is reissued without alteration, intending planters, before planting specially for local purposes, should take into account the fact that in developing an export trade large quantities of apples slightly below export standards will be held for local consumption. They should consider this in conjunction with the supply of late apples now produced, and the comparatively large areas of these varieties which have not yet come into bearing, the whole of which will be confined to the local market other than those required for the South American trade, should the latter be again made available.

(4.) In short, the conference, although it is of the opinion that the varieties given in the different lists are suitable for the purposes named, is strongly of the opinion that the time has arrived in the history of the Dominion when concentration should be made on the two leading mid-season varieties equally suitable to all markets—namely, Jonathan and Delicious. Jonathan is a well-known variety, and its weaknesses are recognized, but these can be overcome under proper cultural treatment. On the other hand, its well-known attractive appearance when properly grown renders it a highly suitable export apple. Delicious has rapidly become a world-wide favourite. It is easily the highest-priced apple of its season in New Zealand at the present time. It has two weaknesses: Firstly, it is somewhat subject to black-spot; but this can be guarded against by timely spraying. Secondly, it is apt to grow somewhat

* *Journal*, March, 1916, page 205.

large ; but this is corrected to a large extent as the tree ages, and in any case this has never affected its popularity. In addition to restricting planting mainly to the two varieties mentioned, the conference is strongly of the opinion that a great amount of good to the industry could be effected by top-working many of the existing trees of undesirable varieties with Delicious.

(5.) The conclusions of the previous conference relative to the Sturmer apple were confirmed—namely, while fully appreciating the many excellent qualities of this variety, the fact that it reaches maturity too late to allow of heavy shipment to European markets should not be overlooked.

(6.) Growers are advised to consider the possibility of a pear-export trade with the United States of America. Many favourable reports relative to this have recently come to hand. New Zealand is in direct communication with both the east and west coasts of that country, thus enabling huge markets to be tapped. The varieties of pears recommended for export appear later in this report.

Before adjourning the conference carried a resolution strongly favouring the holding of a varieties conference at least every other year.

The following subjects were dealt with by the conference, and varieties recommended to suit :—

(1.) Apples and pears for Northern Hemisphere markets.

(2.) Apples for South American markets.

(3.) Apples, pears, peaches, nectarines, plums, prunes, cherries, and apricots for local markets.

The varieties recommended are as follows :—

NORTHERN HEMISPHERE.

APPLES: DOMINION LIST.

Gravenstein (1).
Golden Pippin (2).
Willie Sharp (3).
Cox's Orange (4).
Jonathan.
Delicious.
Dunn's (Monroe's Favourite) (5).
Cleopatra.
Scarlet Nonpareil.
Rome Beauty.
Statesman.
Sturmer (6).

(1) Very suitable for early shipments. Brings good price on local markets.

(2) Keeping-qualities doubtful. Does well in Auckland District. Very suitable for canning.

(3) Hardy, blight-proof tree ; heavy bearer. Fruit keeps well for season.

(4) Excellent quality ; indifferent bearer. Subject to bitter-pit. Probably enough already planted.

(5) Not high class. Enough of this variety already planted.

(6) Excellent all-round variety, but somewhat late for heavy shipment to Europe.

APPLES: DISTRICT LISTS.

The representatives of the various districts selected from the Dominion list of varieties recommended for the markets of the Northern Hemisphere those varieties best suited for their particular districts, as follows :—

Auckland.

Gravenstein.
Golden Pippin.
Willie Sharp.
Dunn's (Monroe's Favourite).
Jonathan.
Delicious.
Rome Beauty.
Statesman.
Sturmer.

Hawke's Bay.

Gravenstein.
Willie Sharp.
Jonathan.
Delicious.
Dunn's (Monroe's Favourite).
Sturmer.

Wairarapa and Wellington.

Gravenstein.
Cox's Orange.
Jonathan.
Delicious.
Dunn's (Monroe's Favourite).
Sturmer.

Canterbury.

Cox's Orange.
Jonathan.
Delicious.
Dunn's (Monroe's Favourite).
Rome Beauty.
Statesman.
Sturmer.

Nelson.

Cox's Orange.
Jonathan.
Delicious.
Dunn's (Monroe's Favourite).
Statesman.
Sturmer.

Otago.

Gravenstein.
Cox's Orange.
Jonathan.
Delicious.
Cleopatra.
Scarlet Nonpareil.
Rome Beauty.
Statesman.
Sturmer.

SOUTH AMERICA.

APPLES: DOMINION LIST.

Jonathan.
Delicious.
Dunn's (Monroe's Favourite).
London (Five-crown) Pippin.
Lord Wolseley.
Dougherty.
Cleopatra.
Yellow Newtown Pippin.
Rome Beauty.
Statesman.
Sturmer.

LOCAL MARKETS.

APPLES: DOMINION LIST.

Beauty of Bath.
Red Astrakhan.
Lord Suffield.
Gravenstein.
Golden Pippin.
Scarlet Pearmain.
Worcester Pearmain.
Cox's Orange Pippin.
Alfriston.
Jonathan.
Reinette du Canada.
Delicious.
Dunn's (Monroe's Favourite).
London Pippin.
Lord Wolseley.
Cleopatra.
Yellow Newtown Pippin.
Rome Beauty.
Statesman.
Sturmer.
Dougherty.
Ballarat.

PEARS: DOMINION LIST.

Beurre Bosc.
Beurre Capiaumont.
Beurre Clairgeau.
Beurre d'Anjou.
Beurre Diel.
Doyenne du Comice.
Directeur Hardy.
Durondeau.
Giblins Nelis.
Glou Morceau.
Josephine de Malines.
Marie Louise.
P. Barry.
Twyford's Monarch.
Winter Cole.
Winter Nelis.

The conference reaffirmed the resolution passed by the previous conference warning intending planters against very extensive planting of any variety of pears for local markets, particularly the early and mid-season varieties. Planting for the local markets should be mainly confined to the later keeping varieties, selected to suit the locality, from the following (which are also highly suitable for export) :—

Beurre Bosc.
Twyford's Monarch.
Doyenne du Comice.
Winter Cole.
Winter Nelis.
Josephine de Malines.
P. Barry.
L'Inconnue.

The following varieties may also be grown with satisfaction in localities having canning-facilities :—

Williams' Bon Chrétien.
Keiffer's Hybrid.

If, however, a rotation of pears is desired, the following should prove satisfactory :—

Williams' Bon Chrétien.
Louise Bonne of Jersey.
Packham's Triumph.
Conference.
Beurre Diel.
Beurre Bosc.
Doyenne du Comice.
Winter Cole.
Winter Nelis.
P. Barry.
L'Inconnue.

STONE-FRUITS: DOMINION LIST.

PEACHES.

D. denotes dessert ; C., canning ; W., white flesh ; Y., yellow flesh ; F., freestone ; Cl., clingstone ; and S.Cl., semi-clingstone.

Early Varieties.

Sneed	D.W.F.
Briggs' Red May(1)	D.W.F.
High's Early Canada(2)	D.W.S.Cl.

Second-early Varieties.

Hales	D.W.F.
Wiggins	D.W.F.
Carman	D.C.W.S.Cl.
Delicious	D.Y.F.
Peregrine	D.W.F.

Mid-season Varieties.

Elberta	C.Y.F.
Kalamazoo	D.C.Y.F.
Up-to-Date	D.C.Y.F.
Kia Ora	D.C.Y.F.

Late Mid-season Varieties.

Paragon	D.C.Y.Cl.
Muir	D.C.Y.Cl.

Late Mid season Varieties—continued.

Sea Eagle Improved	D.W.F.
Wheatland	D.C.Y.F.
Prizetaker	D.W.F.

Late Varieties.

Lippiatt's Late Red	D.W.Cl.
Golden Queen	D.C.Y.Cl.
Solway	C.Y.F.

Additional Varieties.

Mayflower.
Sanders.
Alexander's Early.
Royal Charlotte(3).
Housted's Early.
Le Varuguer.
Osprey Improved.
Hobbs's Late.
Lady Palmerston(4).

(1) and (2) Retained for benefit of Central Otago.
(3) Not well known. Included for benefit of Hawke's Bay.
(4) Not in favour in Auckland.

NECTARINES.

Ansenne.
Cardinal.
Early Rivers.
Goldmine.
Hunt's Tawny.

PLUMS (ENGLISH).

Angelina Burdett.
Coe's Golden Drop.
Damson-Russian.
Diamond.
Early Orleans.
Early Rivers.
Evans's Early.
Grand Duke.
Greengage.
Jefferson.
Kirk's.
Magnum Bonum (Yellow).
Monarch.
Bond's Seedling.
President.
Takapuna Drop.

PLUMS (JAPANESE).

Burbank.
October Purple.
Satsuma.
Sharp's Early.
Wright's Early.
Sultan.

PRUNES.

Golden Prune.
Giant.
Petite d'Agen(1).
Tragedy.

(1) Cracks badly in some districts.

APRICOTS.

Bolton.
Hemskirk.
Moorpark.
Newcastle.
Cullin's Early.
Royal Late.
Roxburgh (large red).

CHERRIES.

The following are recommended for planting :—

Bigarreau Twyford.
Early Purple Guigne.
Early Rivers.
Black Eagle.
Bigarreau Jabaulay.
Florence.
Black Tartarian.
Bigarreau Napoleon.
May Duke.
Early Lyons.
Bedford Prolific.
White Heart.
Knight's Early Black.
St. Margaret.
Werder's Early Black.

VARIETIES FOR FURTHER INVESTIGATION AND TESTING.

Reports submitted by the Department on varieties of apples recommended by the previous conference for testing were considered. The following varieties and classes of fruits were recommended for further investigation and report, including testing where necessary. In this connection the conference resolved that these matters should not be left entirely to the Department, but that growers should assist in every way possible, keeping the Department informed of the results of their investigations for the benefit of a later conference.

APPLES.

Glengyle's Red.
Grannie Smith.
King David.
Marian Red.
New Gold Pearmain.
Brighton (Patoka).
Premier (Nelson).
Shorland Queen.
Stayman's Winesap.
Parlin's Beauty.
Ranelagh.
Albany Beauty.
Rival.
Late Market.
Salome.
Beecroft.
Shepherd's Perfection.
Bonum.
Giant Jenneton.
White Winter Pearmain.
Tasma.

NECTARINES.

Grand Admiral.	Mrs. D. Chisholm.
Lily Baltet.	Victoria.

PLUMS (ENGLISH).

Reine Claude de Bavay.	Washington.
Victoria.	Denyer's Victoria.

PLUMS (JAPANESE).

Doris.	Bellena.
Maynard.	Formosa.
Santa Rosa.	Hermosilla.
Ngata.	

APRICOTS.

Marlborough.

CHERRIES.

Fruheste Der Mark.	Gean d'Annonay.
Claremont.	Bellelleu.
Centennial.	Noble.
Black St. Margaret.	Bing.
Chapman.	

NOTE.—Mazzard and Gean are considered to be the best cherry-stocks.

ARTIFICIAL BROODING OF CHICKS.

AN IMPROVED FIRELESS BROODER.

F. C. BROWN, Chief Poultry Instructor.

PARTICULARS and illustrations are here given of a simple style of fireless brooder that has been used with great success at the Avonhead Training-farm and Cashmere Sanatorium for returned soldiers, at Christchurch. It has also been worked with favourable results by some of the leading poultrymen of Christchurch. It first came under my notice when being used by Mr. F. Ward, of Hornby, who, to the best of my knowledge, was the originator.

There are many different styles of fireless brooders for rearing artificially hatched chicks, and this one, like all others, can only prove successful when certain primary essentials have been observed. The first thing necessary is to see that the parent birds are fed and managed in such a way that eggs will be produced containing the desired strength of germ to produce a strong healthy chick. It may be safely said that success or otherwise chiefly depends upon the health and vigour of the chicks when placed in the brooder. Breeding from overfat hens that have had insufficient exercise, or birds that have been forced for heavy laying, is a common cause of delicate chicks being hatched and heavy mortality taking place during the brooder stage. Weak chicks may be reared in a heated brooder, but with the fireless type this is a most difficult task. Indeed, it is one of the great advantages of the fireless brooder that weaklings usually die off during the first few days. There-

fore the greater the number of these weaklings the greater will be the number lost. If the breeding-stock are properly managed and the chicks are strong when put into the brooder it can be depended upon to do the rest, providing, of course, that both brooder and chicks are handled in an intelligent manner. Like any other brooder, this one is not fool-proof. Even with the strongest of chicks failure is inevitable if the little details which go towards success are not observed in every respect.

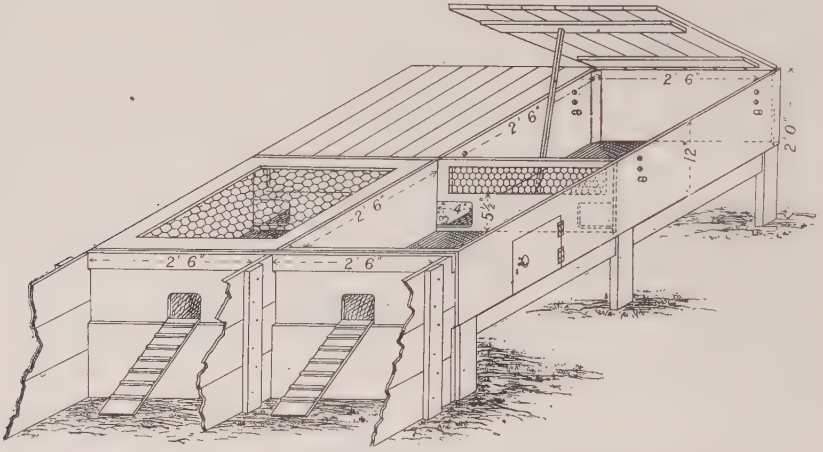


FIG. 1. THE DOUBLE FIRELESS BROODER.

Part of inside runs showing in front.

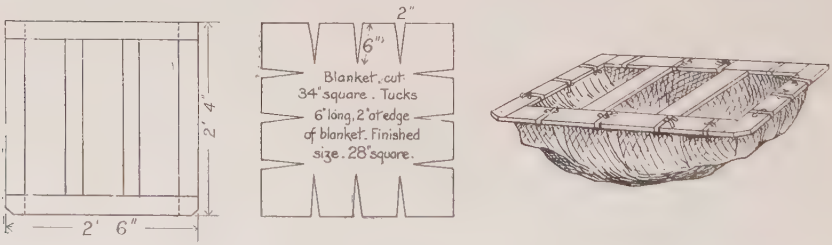


FIG 2. DETAILS OF HOVER.

(a) Frame; (b) blanket cut to shape; (c) blanket attached to frame.

For the work of rearing chicks by artificial means it is next to impossible to lay down any hard-and-fast set of instructions that must be followed. It should be remembered that the best brooder ever made is merely a substitute for a natural process, and that if success is to be achieved the only safe course is to take an object-lesson from the natural mother with her brood. It will be noticed that for the first few days her whole endeavour is to keep the chickens under her wings for the purpose of keeping them warm and comfortable, while at the same time they are given an opportunity to breath fresh air—that

great essential for their welfare. It will also be seen that the hen does the hardening-off process by degrees. At first only a few minutes are allowed the chicks to feed and exercise, when she calls them back to the warmth of her body. As they grow older the time given to exercise is extended, but at no time does she neglect to give them a warm-up when required. The hen studies the weather, and time for exercise is allowed according to it. So also with the brooder under notice, the system of management must be varied according to the season of the year and local conditions generally. Not only the weather but also the appearance of the chicks must be studied from day to day, and the conditions varied accordingly.

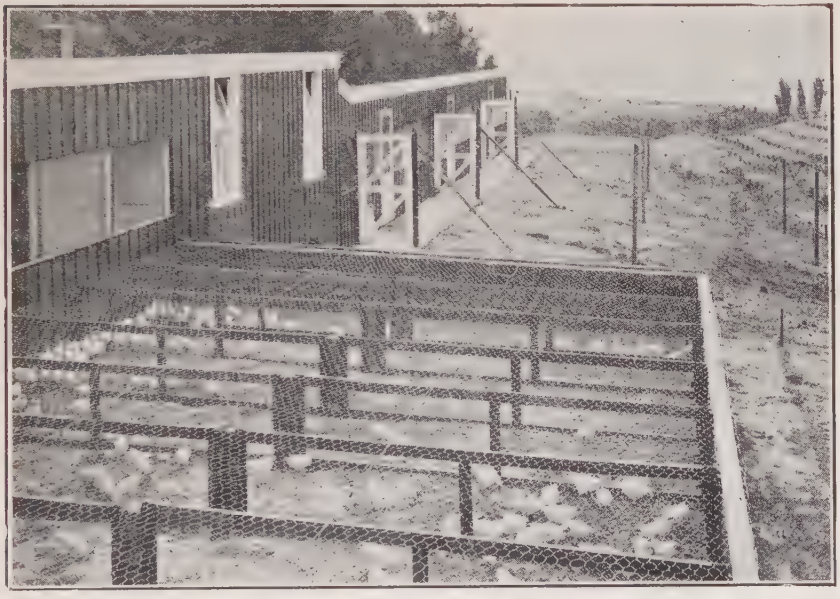


FIG. 3. VIEW SHOWING OUTSIDE RUNS AT THE CASHMERE PLANT.

SOME DETAILS AND POINTS.

The accompanying illustrations of the brooder are so plain that a lengthy description of its construction is unnecessary. The following details and points, however, may be useful :—

The brooder may be made double or single, according to requirements. The sides, ends, and centre boards are made of 12 in. x 1 in. timber, and the bottom of floor-boards. The hover-frame is made of 2 in. by $\frac{1}{2}$ in. material, and measures 2 ft. 6 in. by 2 ft. 4 in. It is supported by movable wooden pegs placed in holes in the sides of the brooder, the bottom holes being $5\frac{1}{2}$ in. above the floor. On the underside of the hover a piece of blanket is attached with pieces of tape here and there. It is necessary that the blanket have sufficient sag to actually touch the floor. This can be best arranged by using a piece of blanket 34 in. square and cutting out V-shaped pieces 2 in. wide by

6 in. long, as shown in Fig. 2 (b). Sew the edges together where the V pieces have been cut out. This will reduce the size to 28 in. by 28 in., which will give the desired sag when tied to the frame as directed. On top of the hover-frame two 2½ in. by ½ in. battens are fixed as supports of any additional covering that may be used, the object being to keep the weight of this off the chicks' backs, which is most important. As a rule a clean grain-sack doubled in two will provide sufficient covering in addition to the blanket during the early stages. This extra covering should, of course, be reduced as the chickens develop.

Care must be taken that the sack does not touch the end of the brooder-box or the system of ventilation provided will be interfered with. The principle of applying ventilation with this brooder without subjecting the chicks to draught is probably its strongest advantage over most other systems. It will be seen that the fresh air enters through the openings in the front board, and passes out at the back of the hover, where there is a space of about 1 in. by ¾ in. It then travels over the top of the hover and comes out through the wire netting in front. The latter is merely to act as a means of preventing the chicks from jumping on top of the hover.

When the chickens are young it is important that the hover-frame fits closely on top of the front board of the hover section. It is also important that the openings for the chicks to enter and leave the hover section be never closed, except with a piece of small-mesh wire netting. Fixed on four bent nails, this will prevent the chicks, when young, from leaving the hover section, while at the same time the admittance of fresh air will not be cut off. The lid covering the hover is made of tongued-and-grooved boards.

For bedding, dry straw chaff is recommended. To prevent draught the floor is covered with newspaper before the chaff is placed thereon. To lessen the risk of the chicks becoming chilled when first placed in the brooder the chaff should be previously made warm by means of a hot brick, the brick to be removed before the chicks are put into the brooder. For the first few days, and after allowing the chicks a few minutes to feed, they should be gently pushed back under the hover, as, having no artificial heat to induce them to go under it, they are apt to stay out too long and become chilled. When the youngsters have learned to run in and out of their own accord, access to the second chamber should be given them at all times. From this on increase their liberty by degrees until the outside runs are reached.

This (single) brooder will accommodate from sixty to seventy chicks for the first three weeks, after which time the number should be reduced. When more than one brooder is being used a space of about 18 in. should be left between each, so that the chicks can be attended to from either side, while a convenient space should be left between the end of the brooder and the back wall of the house. As a matter of convenience the brooder should be placed on a stand 1 ft. high. The inside runs are boarded up 2 ft. high. To prevent the chicks from flying over, light movable wooden frames covered with wire netting are placed on top.

A brooder-house is best made on the lean-to style, 8 ft. 6 in. high in front and 6 ft. 6 in. at back. To provide ample space for the chicks to exercise during wet and cold weather it should be at least 16 ft. deep. The house should be opened up in front according to local weather

conditions, the opening being covered with sparrow-proof wire netting. Usually an opening of 3 ft. in height will be suitable for most localities. On the inside above the opening, wooden frames covered with sacking or other suitable material should be hinged and arranged in such a way that they can be raised or lowered according to weather conditions.

The outside runs are 2 ft. 6 in. high. The division fences are made of wooden frames covered with 1 in. wire netting, which fit into slots fixed to the posts. The top of the runs is covered with 6 ft. wire netting of 2 in. mesh. With this arrangement the runs (except the posts) can be readily taken down in the off season and put under cover, while the ground can be dug up and sown down.

PHOSPHATES: THE PRESENT POSITION.*

B. C. ASTON, F.I.C., F.N.Z.Inst., Chemist to the Department.

NEW ZEALAND farmers are now spending about half a million sterling annually on manurial phosphates, all of which—with the exception of a comparatively small amount of locally produced bonedust and mineral phosphate—have to be imported from other countries. Unless our agricultural practice is very much in error, the phosphate-supply is a highly important matter to New Zealand, and one which merits the closest study from all who have the welfare of the Dominion at heart.

It is in the North Island, particularly the northern portion of it, that—under the present system—heavy phosphatic manuring has proved so necessary. Fortunately, our needs were well put forward at the Peace Conference, and the result is the Dominion's present interest in Nauru Island, which assures a supply of the highest grade of naturally occurring phosphate in the world. This phosphate contains over 80 per cent. of phosphate of lime, whereas basic slag and ordinary superphosphate contain phosphate equal to less than half that quantity. There can be manufactured, however, what is called a double superphosphate, which would contain more than double the quantity that ordinary superphosphate contains, and which, if landed in New Zealand, would save half the cost of freight, handling, and bags. It would have to be mixed up with a diluent before use.

Why then, it may be asked, is it necessary to import from Japan, Europe, and Australia slag and superphosphate when we have at our doors high-grade phosphate? The answer is easier to give for superphosphate than for basic slag. Superphosphate is soluble in water. It is therefore, when applied to the soil, quickly dissolved in the first rain, and reprecipitated in very fine particles all round the plant-roots, which quickly absorb it. Superphosphate has a greatly stimulating effect on the young growing plant, inducing a vigorous growth at the most critical period of all forms of life—infancy. In cruciferous plants like the turnip, with a poor root-system and a capacity for metabolizing sulphur compounds, superphosphate has the added advantage that it

* Substance of an address to the Annual Conference of the New Zealand Council of Agriculture, Wellington, July, 1920.

greatly stimulates root-growth and also contains sulphur compounds—differing in this respect from both phosphate rock and basic slag. In shallow limestone soils, or in soils in which droughty conditions obtain, superphosphate is the favourite phosphatic fertilizer, and it is not likely that phosphate rock (often erroneously called guano), however finely ground, will wholly take its place. Basic slag undoubtedly gives marvellous results in most cases, but I am not certain that its place will not eventually be taken by finely ground phosphate rock of high grade. It will be remembered that field experiments conducted by well-known agricultural professors at Cockle Park, at Aberdeen, and in Essex showed that rock phosphates were but little inferior as a source of phosphoric acid to the higher grades of basic slag. If this be true of the colder soils of Britain it is more likely to be true of the warmer, quicker soils of New Zealand.

With basic slag the case is different. It is, like phosphate rock, an insoluble phosphate, though more soluble in soil-water than phosphate rock. Its most fitting use is as a top-dressing for pasture on poor soils in a moist climate. According to English experience its effectiveness used to be limited to clay soils, but I have proved that it is equally effective on sandy or light pumice soils in New Zealand, provided the rainfall is sufficient and climate generally moist enough. In discussing basic slag it must be mentioned that an important meeting was recently held in London under the auspices of the Faraday Society, at which the subject under discussion was "Basic slags—their production and utilization in agricultural and other industries." The meeting, it appears, was called for the purpose of getting together those interested in the manufacture and use of basic slag, in order to endeavour to increase its value to the farmer without unduly adding to the cost of producing the main product—steel. The directions in which it is thought that the value of slag could be increased are (1) by producing a more uniform product, (2) by making the phosphate more available, and (3) by increasing the output by adding more phosphate to the slag, either in the molten condition or in grinding, or by other mechanical methods. A point which should be noticed is that very large quantities of open-hearth basic slags are now produced containing 5 to 8 per cent. of phosphoric acid which it is impossible to market on account of the high cost of freights, grinding, and bagging. If it were possible to increase the percentage of phosphoric acid in these slags up to 10 per cent. it would then be possible to market them. To effect this it is necessary to obtain the co-operation of the steel-manufacturers. It is satisfactory to learn that the meeting resolved to refer the matter to the Ministry of Agriculture with the view of taking the matter up with the Iron and Steel Institute.

Another point which strikes one in reading the report of this meeting and the remarks of the president, Sir Robert Hadfield, that the Faraday Society had already done good work in getting the nitrogen-products committee set up is that the viewpoint of Great Britain with regard to fertilizers is essentially different from that of Australia and New Zealand. The dominant fertilizer demanded by Great Britain is nitrogen, and the anxiety has always been in the direction of obtaining supplies of this for the wheat crop and for manuring generally. After utilizing the locally produced sulphate of ammonia, this nitrogen comes mostly from Chile (nitrate of soda). The phosphates required by Britain have been easily obtained from Europe, North Africa, and the eastern and southern

parts of the United States of America. Until the war upset things there does not seem to have been much concern expressed about phosphates. The difficulty seems to be for Britain to realize that phosphates are just as real a necessity for New Zealand as nitrogen is for Britain. The moral, if New Zealand wishes to be considered in the distribution of the phosphates of the world, is to act now, for it certainly looks as if—with the advancement of knowledge in extracting manurial nitrogen from the air, and possibly the cheapening of potash salts owing to new sources of supplies — phosphate may become the limiting factor in intensive agriculture. It must be borne in mind that, although the earth's crust contains something over 2 per cent. of potassium and the air 75 per cent. of nitrogen, the earth contains only 0·1 per cent. of phosphorus. Americans see hope in the discovery in their vast continent of new deposits of phosphate, and certainly this appears to be the most reasonable ground for hope. Phosphates, however, are not such an easy thing to discover. When a scientific people can be guilty of the mistake of metalling roads with phosphate rock—which has happened more than once—it will be realized that vast deposits may yet await the lucky chance or the patient explorer that may bring them to light in areas where they are now unsuspected.

In this connection I would like to draw your attention to the extraordinary way in which the known phosphate deposits are distributed over the earth. On looking at the map published in the *Journal of Agriculture* for August, 1915 (p. 113), it will be seen that there are no phosphate deposits known in the great land-masses to the east of a line drawn through India to Siberia, none in South America, and none in South Africa. There may be a geological reason for this, but the most obvious explanation seems to be that the phosphate deposits do exist in those countries but have not yet been discovered. The Chinaman is at great pains to preserve all waste products which contain phosphate. He is amazed at the waste incurred in our Western methods of sewage-disposal—a system which, every year, for every million adults sends to the sea phosphate equal to 7,000 tons of pure phosphates of lime. But the Western world would find an element of humour in the situation if available phosphate deposits were discovered in China, after all the centuries in which these Eastern races have been so tenderly saving and utilizing their waste products in order to maintain the fertility of the soil sufficiently to grow their staple cereal, and one having the least nutritive value of any—rice. However, as Europe has recently been helped by islanders, so may the Eastern continent by Japan, who has already found phosphates within her own borders, and has learnt to fertilize the paddy-fields with phosphate.

I think enough has been said to show the importance of a phosphate-supply for New Zealand. Granted that adequate supplies can be obtained from the Pacific islands, will the farmer be able to continue paying the price for such heavy dressings as are now the practice; and, if not, how can the burden be lightened? A correct appreciation of the situation might mean considerable study, after having all the data which accurate field experiments could give. As a step in the right direction, one would like to see a proper estimate prepared of the available resources in the Dominion, including the deposits of Clarendon, Milburn, and the islands lying off the coast near Dunedin, which contain deposits of aluminium phosphate. The latter is a form which is now

being imported from Australia under the heading of "Victorian phosphate"; but we know nothing of the value of this form of phosphate on New Zealand soils. Then, as I have before advocated, accurate field experiments are required on the possibility of economizing phosphates by the use of lime, following Hilgard's dictum that on soils rich in lime much less phosphate is required than on soils deficient in lime. Further, there are many vexed questions to deal with regarding the proper form in which to apply phosphates and lime, and as to the real value of nitrogenous and potassic manures for North Island conditions, requiring several years careful experimenting in the field on different types of soil and in different climates. If the statement that 100,000 acres of pasture land in the Dominion are yearly reverting to scrub and fern is not an exaggeration, the position is sufficiently serious to warrant a large expenditure on experimental work in order to find out how the trouble can be remedied; and adequate manurial treatment, where the country is suitable, may be the cheapest way of combating this retrogression of pasture land. On pumice lands, for instance, with pasture going back to fern, complete cures have been established by top-dressing with phosphates.

In conclusion, I would offer this advice to those who are concerned with the development or maintenance of the fertility of New Zealand lands: Make phosphate the chief manuring, and strive after the finest possible grinding, remembering that phosphate becomes less available to plants in the soil, and in this respect differs from lime or limestone, which becomes more available. Hence limestone may be ground much more coarsely than phosphate, especially phosphate rock, which should always be applied in the finest impalpable flour. Get the highest grade of phosphate you can—over 80 per cent. if possible—but do not use any low-grade phosphate of unknown origin, or aluminium phosphate, or mixtures containing this, until it has been tested on New Zealand soils. Contemporaneously with phosphate treatment develop the limestone resources of your district. Now that we have the Lime Committee actively at work, and I have the full sympathy and support of my two colleagues—Messrs. Furkert and Morgan—advice will be freely and, I hope, quickly given on all points connected with the development of the limestone resources of the Dominion, whether it be a matter of chemistry, engineering, or geology. Make good use of the Instructor in Agriculture in your district, and get him to take careful and accurate samples of the typical soils—not taken foolishly or selfishly in one or two paddocks of one particular man, but across the face of the country from situations which a committee of farmers knows to be similar. The taking of these well-drawn representative samples will be of great value in determining what amount of lime each district requires.

Sale of Fruit.—Some 7,600 registered numbers have been issued under the regulations relating to the sale of New-Zealand-grown fruit for consumption within the Dominion.

Limestones.—Samples of limestone from various localities recently tested by the Chemistry Section gave the following percentages of carbonate of lime: Utiku, 66; Morrinsville, 71; Kara, 56; Dairy Flat, 78 and 79; Kaipara, 89 and 69; Marohemo, 75.

TOMATO VARIETY TESTS.

DURING the past season tomato variety tests were carried out by the Horticulture Division at Tauranga, Havelock North, Nelson, and Christchurch. Seeds were obtained from various sources of varieties grown for commercial purposes. A portion of the seed of each variety was sent to the different centres so that all might have the same strain. The following varieties were grown in each place: Selected Large Red, Selected Kidson, Sparks's Earliana, Chalk's Early Jewel, Dreadnought, Russian, Stokell, Clark's Favourite, Fillbasket, Holmes's Ideal, Hillside Comet, and Kondine Red. Reports from three of the four growers favour Selected Kidson and Selected Large Red, one placing Selected Kidson first. The fourth grower (Christchurch) places Stokell first, with Russian and Holmes's Ideal very close to it.

These trials were undertaken at the request of a number of Nelson growers who desire to obtain varieties better than those they are growing. With regard to this, it may be said at once that growers should rely on their own selection rather than on any particular variety. In all seedling crops variations are observable. This is particularly noticeable where there has been no selection. A tomato-grower should search his plantation for a plant or plants that exhibit the desired characteristics, save seeds from such plants, and follow up the process of selection till he gets a stock with the qualities desired. The chief characteristics desired are setting of the first bunch near the ground, short internodes, regular setting of fruit throughout, fair fruit and bunches, and ripening of the top bunches in good time. The value of selection is proved by these trials, seeds of the variety that found most favour having been obtained from one of the most successful tomato-growers in the Dominion and being from a carefully selected strain.

The fact that Selected Kidson and Selected Large Red were condemned only in the Christchurch tests requires explanation. The whole of the plants were badly checked by frost early in December, which had the effect of seriously reducing the crop. This resulted in the larger varieties producing abnormally large fruit unfit for market, while the smaller varieties gave fruits probably of larger size than would have been obtained had there been a full crop. For this reason the Christchurch tests must be regarded as, to say the least, not conclusive. It is also a fact that the Christchurch market requires small or medium-sized and round fruits. Whether this is entirely a desire of the consumers or has been brought about by the growers is not of any moment: It is so, and other types are not popular. Quite the opposite is the case in the Wellington market.

With regard to this matter it is quite certain that public taste can be guided, also that it has prejudices that can be overcome. It is not true that all round varieties are superior in flavour to all corrugated fruits; some are, others are not. A selection from corrugated varieties that will satisfy the market can be found. The only question the grower has to decide is how to get the best return for his labour. Small fruits

command most money per case, but the small fruits cost more to produce. An extra sixpence or even more per case is more than lost by the extra cost in gathering and packing. There is abundant and positive evidence that most money is made by growing a fair-sized fruit.

—*Horticulture Division.*

TESTING OF PUREBRED DAIRY COWS.

CERTIFICATE-OF-RECORD LIST FOR THE HALF-YEAR.

W. M. SINGLETON, Assistant Director of the Dairy Division.

THE appended lists give particulars of the records of those cows and heifers which have qualified for certificates this year up to the end of June. The numbers are small owing to the fact that few cows finish their test during the first six months of the year. Many cows, however, are now nearing the end of their lactation period, and for the remainder of the year a large number of records will be reported.

RECORDS FROM 1ST JANUARY TO 30TH JUNE, 1920.

Name and Class of Cow.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		JERSEYS.				
Junior Two-year-old.		Yrs.dys.	lb.		lb.	lb.
Gamboge's Wonder	J. K. Richards, Kapuni	1 332	240·5	365	6,968·2	440·94
Duke's Nancy ..	E. Harding, Woodville	1 293	240·5	282	4,804·3	273·05
Senior Two-year-old.						
Patricienne ..	R. F. Wilkinson, Pukekohe	2 264	266·9	343	7,668·3	409·86
Four-year-old.						
Springfield Rosemary	C. H. Thompson, Hastings	4 23	315·8	365	7,696·0	406·44
Collingwood's Choicest	Estate of F. E. Hellyer, Dunedin	4 94	322·9	324	7,691·7	380·21
Mature.						
Sylvanus Silverlocks II	Geo. Buchanan, Paeroa	10–11 years	350·0	363	7,993·3	396·54
Creamy Lass ..	Geo. Buchanan, Paeroa	6 168	350·0	334	6,779·2	355·00
		FRIESIANS.				
Junior Two-year-old.						
Cluny Pietje Kate V	Cluny Friesian Farm, Wellington	1 154	240·5	365	9,869·2	379·98
Cluny Netherland Colantha VIII	Cluny Friesian Farm, Wellington	1 187	240·5	365	8,393·8	309·58
Rosevale Sylvia Keyes	H. North and Sons, Omimi	1 226	240·5	196	8,377·7	264·63
Senior Two-year-old.						
Oakwood Daisy Bell	W. D. Hunt, Invercargill	2 341	274·6	365	13,255·1	496·12
Cluny Pietje Kate IV	Cluny Friesian Farm, Wellington	2 273	267·8	365	8,634·2	328·64
Riverlea Duchess ..	C. H. Steadman, Waikiekie	2 342	274·7	365	9,105·8	304·01

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
FRIESIANS—*continued.*						
Junior Three-year-old.		Yrs.dys.	lb.		lb.	lb.
Colantha Lass of Groteholm	R. M. Taiaroa, Taumutu	3 44	281·4	365	14,825·0	548·73
Monavale Madeline Paxton	C. C. Buckland, late of Cambridge	3 155	292·5	255	14,040·5	533·15
Riverdale Cherry Blossom	S. Clements, Hamilton	3 106	287·1	365	10,561·2	364·73
Senior Three-year-old.						
Cluny Hope II ..	Cluny Friesian Farm, Wellington	3 282	305·2	364	8,390·5	306·14
Mature.						
Mutual Pearl of Rock	W. Barton, Featherston	7 11	350·0	365	25,648·2	903·44
Countess of Leith ..	W. D. Hunt, Invercargill	6 88	350·0	365	16,571·9	589·51
Buttercup of Kokatau	Cluny Friesian Farm, Wellington	8 101	350·0	305	12,243·6	416·67

SECOND-CLASS CERTIFICATES.

Following are the records of five cows, which are the first to qualify for second-class certificates of record under the extension of the C.O.R. system brought into force at the beginning of this year :—

Name and Class of Cow.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS.						
Junior Two-year-old.		Yrs.dys.	lb.		lb.	lb.
Milady	H. C. Sampson, Hillsborough	1 350	240·5	364	7,209·5	388·67
Senior Two-year-old.						
Frisky Irene ..	James Hunter, New Lynn	2 316	272·1	365	7,174·7	420·97
Three-year-old.						
Rose's Speck ..	D. P. F. Malone, Riverlea	3 269	303·9	365	10,047·2	598·10
Mature.						
Lady Peggy ..	E. Griffiths, New Plymouth	6 69	350·0	365	11,261·0	736·98
MILKING SHORTHORNS.						
Mature.						
Pine Farm Sarah ..	J. H. Parkinson, Opotiki	*	350·0	365	10,999·1	481·84

* Mature.

The *Journal* completed the first ten years of its existence with the May issue, the first number having been published in June, 1910. Seven months were included in Volume I, and the twentieth half-yearly volume closed with last month's issue.

WORK FOR THE COMING MONTH.

THE ORCHARD.

THE word "organization" as applied to the fruit industry of the Dominion is, unfortunately, owing to its use in season and out of season, beginning to lose some thing of its real force and meaning so far as quite a number of our fruitgrowers are concerned. The word "unfortunately" is advisedly used in consideration of the fact that organization must become still more familiar with the fruitgrower, not as a word alone but as an operative fact, before the industry can be raised to that position when it can be relied upon to meet and overcome the many difficulties which it has yet to face.

It is realized, however, that growers in several instances have had cause to regret the part they have been called upon to play in previous attempts at organization. That early disappointments in this direction have been the lot of other countries no doubt provides scant consolation, but this fact, together with our successes, should be taken into account when considering our failures. That we have met with considerable success in our organization work cannot be denied, and, although no scheme is yet universal in its operations, the fruit industry would have been in a very much worse state than it is to-day had those successes not been attained.

Recent events which have taken place in Wellington, in the form of sundry conferences, suggest that those most prominent in the industry are anxious to safeguard the future by evolving a system of distribution and marketing which will be more general in its effect than anything applying to the past. What the outcome of the whole of this will be, or what system, if any, will eventuate, time alone will tell; but in the future interests of the industry if proposals are submitted they should at least receive the careful and unprejudiced consideration of every fruitgrower before he decides to withhold his support.

In the meantime the orchard requires attention. The dormant season marks the opening of the year's operations, and, although the crop will not be harvested for many months, the care and attention bestowed on the orchard throughout the season has its effect on the quality of the fruit produced. This, again, has a very decided effect upon the commercial side of the industry, for no marketing system can be expected to return the fullest satisfaction unless it is supported by high-grade fruit properly prepared and packed for sale.

—*J. A. Campbell, Assistant Director of the Horticulture Division.*

AUCKLAND.

The fine weather which usually prevails at intervals during August provides favourable opportunities for the successful carrying-out of orchard planting, which is best completed early in the month. Stone-fruits should receive the earliest attention, owing to their coming first into bud and consequently into root-action.

All winter spraying should be completed without delay, and all prunings duly picked up and destroyed by burning. When the July oil sprayings for the control of scales, spider, and aphis have been deferred August will afford further opportunities of applying this all-important spray to pip-fruits; but the spray will have to be slightly reduced, and growers are advised to use 1–12 to 1–14 so long as no bud-movement is noticeable. The spraying of stone-fruits for the control of fungoid diseases should be thoroughly carried out with bordeaux, 8–6–40, or copper sulphate, 1–16, just when the buds begin to swell. All newly planted strawberry-beds should be gone through with bordeaux, 4–4–40, to protect the plants from attack by leaf-spot.

Early spring cultivation may be commenced during the month, or as soon as the weather conditions and state of soil will permit. It is essential that both

the ploughing and cross-ploughing should be completed before the spring growth reaches its height, principally on account of the very strong growth of clovers or trefoils obtaining in northern orchards, making it otherwise a hard task to carry out successful cultivation. Many growers are expressing their intention, on account of the high cost of labour, of ploughing right up to the trees this season, so as to dispense with digging around them. This is undoubtedly a good plan under the circumstances, but in orchards where it has not hitherto been practised, and where the spread of the trees will allow of it, great care must be exercised to avoid as much as possible the disturbance of the existing root-system. The recognized orchard practice at this stage is to plough away from the trees, working the soil back as early as possible should there be danger of root-damage from dry winds, &c. Early opportunity should be taken to bring the soil into good tilth by harrow or disk as may be required, in order that the cultivator may follow unhampered in later months.

Where rabbits or hares are troublesome to young trees, wire netting, if procurable, is the surest method of protection. If this is unobtainable paint the trunk a short distance up the leaders with fresh cow-manure made liquid with bullock's blood.

It is necessary for citrus-growers to take timely warning regarding a recurrence of last season's heavy frosts. Wherever possible heaters should be put into operation in the groves where the trees are too big for protection by covering with scrim or sacking.

Scions for grafting should now be selected from vigorous healthy trees, and heeled in in friable loam.

In connection with the outbreak of fire-blight in the Auckland District, it is as well to warn orchardists at this juncture that all cankered areas in apple, pear, or quince trees should be cut away at pruning-time and destroyed by fire, always remembering that after each cut the pruning implements must be immersed in a disinfectant solution of formalin 1 part, water 20 parts.

—J. W. Collard, Orchard Instructor, Auckland.

HAWKE'S BAY.

Pruning should be made the first consideration, as the season is near when spraying will have to be done regardless of all other work, if clean crops are to be assured.

Planting should be done as early as possible consistent with proper soil conditions. Choose a time when the soil works freely.

Between the time pruning is finished and bud-movement pip-fruit trees should have a thorough spraying with oil; all parts of the tree should be covered, leaving no blank spaces. Recent experiments carried out in this district show that best results are obtained by delaying the application as long as possible, provided the trees are not showing signs of actual growth. Oil, 1–15, applied at this period controls sucking-insect pests other than red mite, while the best results obtainable from oil for mite-control are also secured.

Stone-fruit trees which have not been sprayed during the dormant period for scale insects should receive an application of lime-sulphur, 1–15, as early as possible. Many early-flowering varieties will soon show bud-movement. All trees should be sprayed with bordeaux, 8–6–40, as they attain the stage when the flowers burst their buds. Different varieties will require watching for the proper stage, time of application being almost equally important as the mixture used for leaf-curl and plum-pocket control.

Cross-ploughing and the turning-under of cover-crops should be done as early as soil conditions will allow. A thorough working-up of the soil early in the season will ensure a more congenial soil condition and assist early root-action.

—W. H. Rice, Orchard Instructor, Hastings.

NELSON.

The orchardist will readily perceive the importance of thorough orchard spraying in early spring. To cover the trees with a fungicide which does not allow flying spores to germinate, and to destroy insect-eggs by oily or caustic sprays, is the present method of keeping orchard-trees clean and profitable. Once these organisms get well established in an orchard it is an expensive business destroying them. It is very much easier and cheaper to anticipate the attack. For these reasons spraying should be given first consideration among orchard operations during the present and following month.

The buds of peach and nectarine trees usually commence to move about the middle of the month; apricot and plum trees are somewhat earlier. The best

local practice is to spray them just before this movement with bordeaux, 8–6–40, and about three weeks later, when they commence to blossom, with bordeaux, 6–4–50. This is an effective preventive of shot-hole, plum-pocket, and leaf-curl fungi. Should the trees be troubled with aphides or scales an application of red oil, 1–20, should closely follow the first of the above-mentioned sprays.

Similar treatment is recommended for pear-trees: they commence to break their buds about the end of August, when varieties subject to black-spot more especially should receive the above spraying treatment. Pear-trees affected with pear-mite and scales should have the first application of bordeaux, followed by red oil, 1–15, while the trees are still dormant. The commencement of apple-tree spraying is best deferred till the month of September.

Orchard pruning should be pushed along at every opportunity; it is usually best to have it completed before the trees start into growth.

Orchards on the lighter alluvial lands are usually ready for ploughing during this month. Take every care to make a neat job. Follow it up quickly with two or three strokes of the harrows—on both "angles" as well as on the "straight."

This is an excellent opportunity to lime or manure the land. Make the application after ploughing, covering the whole area of the orchard, and harrow it in. Many heavy-bearing orchards require this attention.

The fruit-store continues to take up a good deal of time and attention. Considerable losses have been made in the past by overcarrying the summer and autumn varieties. These should now be about quitted, leaving only the late sorts of apples and pears in the store. —*W. C. Hyde, Orchard Instructor, Nelson.*

MOTUEKA.

Preparations should be made this month for the control of insect pests. Now is the best time to cope with San Jose scale, mussel scale, mealy bug, and red mite. Red-oil emulsion should be applied immediately at a strength of 1 in 8 to 1 in 10. This spray should not be neglected, as it will be found most effective.

Prunings should be gathered and burned, and the residue used for manurial purposes.

Planting may be carried out now. Care should be taken to procure the best stock available in the shape of strong, well-grown trees—yearling rods for preference. Trim the roots well back before planting, and remove all broken portions. Head back rods to about 15 in. high when planted. Two-year-old trees should be pruned hard back on planting to about 3 in. or 4 in. on three well-selected, evenly spaced branches. If three branches are not available without the third being a weak, spindly growth, it will be found better to leave two good branches only. However, if this can be avoided always try to maintain three forks for the foundation of the future tree.

Keep a careful watch on fruit in store, and market same judiciously, with due respect to market conditions and the keeping-quality of the fruit respectively. There is likely to be so much wastage by keeping fruit too long that the late higher prices will not compensate the loss. Watch especially for bitter-pit development in Sturmers. —*W. T. Goodwin, Orchard Instructor, Motueka.*

CANTERBURY.

By the time these notes appear all pruning operations should be finished. Collect and burn all prunings, thus destroying a possible source of infection.

Planting of new trees, whether as an extension to the orchard or replacing unsatisfactory trees, should be completed as early as possible. Get the best trees possible, and take care in planting, as much of the future welfare of the trees depends upon this operation.

Spraying is by far the most important operation during this season. Again the attention of growers must be drawn to thoroughness, which is one of the key-notes of success. Use plenty of force and cover the whole of the tree. Stone-fruits previously attacked by leaf-curl, shot-hole, &c., should receive a good application of bordeaux, 8–6–40, as soon as bud-movement is noticeable, followed by another application at strength 6–4–50 when the blossom begins to show pink. If good lime is not procurable soda may be substituted. These same sprays may also be applied to pears for the control of black-spot. In the control of woolly aphis and red mite on pip-fruits red-oil spraying may be delayed as long as possible until distinct bud-movement is noticeable, when a thorough application at strength 1–15 to 1–17 may be made.

Spring cultivation can be carried on during the month where the soil is in a suitable condition, otherwise it is better left for a time. If the orchard is

being ploughed it is as well to break down the ploughing by means of the harrows or cultivator as soon as possible.

—*G. Stratford, Orchard Instructor, Christchurch.*

OTAGO.

August will see the pruning operations well in hand and spray-pumps in operation. Before starting this work see that the pump and hoses, &c., are in good condition, and also cleanse the barrel well with hot water, soap, and soda. Failures to get a good oil mixture are sometimes due to lack of cleanliness in this respect.

Insect pests must be treated during the dormant period of the trees if the best results are to be secured. At this time all parts of the trees can be got at, diseases can be seen, and those trees worst affected can receive special attention. Oil sprays are still supreme against insect pests, and experience by experiments and orchard practice has fully demonstrated the fact that the stronger the mixture the better the results obtained. Unfortunately, no one application of spray will keep trees clean all the year, however well applied. For woolly aphis, scales, red mite, and pear-mite on apple and pear trees, oil sprays can be used at from 1–8 to 1–12, according to the condition of the trees and the temperature of the mixture and weather at the time of application. Late spraying with the weaker solution will often, with warm days, give as good results as the strong solutions applied in cold weather. Woolly aphis is by far the worst pest in Central Otago, and should receive more attention in the late autumn. An oil spray should be applied at this time. Spray pear-trees earlier than apple-trees, as the buds are more porous than apple-buds and more liable to injury.

Stone-fruits must be sprayed during August for red mite, green and black aphis, and San Jose scale where these are present, using oil sprays at 1–15. Peach-curl must also be sprayed for early in September. Applications of bordeaux, 8–6–40, or pure bluestone solution, 1–16, can be applied. On varieties very subject to leaf-curl a second application of bordeaux, 4–4–40, can be applied when the buds begin to show pink. Plums, nectarines, and apricots must also receive 8–6–40 bordeaux early in August for plum-pocket, leaf-curl, and shot-hole fungus.

On stone-fruits where it is necessary to spray for both insect and fungus pests bordeaux or pure bluestone solutions can be followed by oil as soon as the trees dry. If the oiling is done first sufficient time must elapse to allow the oil to disappear so that the fungicide will stick and do its work.

During the pruning select scions for regrafting unsuitable varieties, and place them in a damp sheltered spot, or place in a box and lightly cover with sand. Top off the trees to be grafted well above the necessary height required, when new cuts can be made at time of grafting. Where the old stocks are bad with woolly aphis cut off all knots, and paint with red-oil emulsion, 1–1, to ensure a clean start for the new wood.

Quite a lot of fruit is still on hand in ordinary storage, and commencing to shrivel. Growers will be well advised not to hold on to apples too long, as fruit showing signs of wilting will not compete successfully with good cool-stored fruit, which will now be unloading on to the market. Fairly large quantities of cool-store fruit will be available this season.

—*J. H. Thorp, Orchard Instructor, Dunedin.*

POULTRY-KEEPING.

F. C. BROWN, Chief Poultry Instructor.

August may generally be considered one of the best periods for hatching out chickens, and particularly those of the heavier breeds. It therefore ranks as one of the most important periods in the poultry-keeper's annual operations. Unless he is able to hatch and raise sufficient pullets to replace his old stock next year his profits will be seriously reduced.

It is well to reiterate that, if only profitable stock are to be reared, the greatest care should be exercised in selecting eggs for hatching purposes. A mistake often made in this connection, and particularly by many of the farming community, is to gather eggs for hatching indiscriminately from a large flock of hens. To build up or maintain a heavy-laying flock it is imperative to have a

breeding-pen, so that only eggs from those birds possessing undoubted laying-qualities and constitutional vigour are used for reproductive purposes.

The work of hatching chickens by artificial means is usually a simple matter, provided the incubator is of a reliable make and is handled in an intelligent manner. There are now so many different makes of incubators on the market, and so many systems of applying the necessary temperature, ventilation, and moisture, that it is impossible to here give any hard-and-fast instructions that will apply to all machines alike. This being so, the only safe course is for the novice to follow the instructions given by the maker of the particular machine he is using. As a general rule, if the air-cell dries down in accordance with the diagram supplied with the usual book of directions it may be taken for granted that the desired ventilation and moisture are being obtained.

There are other rules which may be applied to all kinds of incubators the observance of which is essential to success. The most important is the maintenance of an even temperature—about 102° F. for the first week, 103° for the second and third week, and 104° when hatching. Remember that when the correct degree of heat is spoken of it means the temperature required by the germ of the egg, which is always floating uppermost irrespective of the position in which the egg is resting on the tray of the incubator. The necessity of having the bulb of the thermometer resting on the top of a fertile egg will therefore be seen. The lamp should be filled every day. Do not turn the flame up high enough to smoke, or soot will collect in the flue. Trim the wick daily by rubbing with a piece of cloth, care being taken to press the corners down, so that the flame will have a round appearance. Renew the wick after each hatch. Keep the burner clean, and wipe from the lamp any overflow of kerosene.

The eggs should be turned every twelve hours, commencing on the third day. Move them gently, especially for the first week, to prevent injury to the embryo. It is not necessary that an exact half-turn should be given; a few extra rolls will do more good than harm. Cease turning the eggs just before they commence to pip. Cool the eggs after they have been in the machine for three days. As a general rule ten minutes once a day for the first week is sufficient. The time may be increased by degrees up to twenty minutes in the second week, and a few minutes longer during the third week.

In working an incubator the greatest care should be taken to see that the connecting-rod between the thermostat and the arm carrying the disk is absolutely straight, otherwise the apparatus will not work with the necessary exactness. Once the screw part of a connecting-rod becomes bent it can never be depended upon, and the only safe course is to take it out and put a new one in its place.

THE APIARY.

G. V. WESTBROOKE, Apiary Instructor.

PREPARATIONS FOR THE SEASON.

ALL necessary supplies for the coming season should now be in hand. Extra hives, covers, and bottom-boards should be made up and painted. Those who have not yet procured their material should not delay, but secure it at once.

Frames may now be nailed up and wired ready for the sheets of foundation. It is not advisable to insert the foundation in the frames much before they are required for use, as it is apt to become brittle and break down. A plentiful supply of foundation-wax and spare frames is, however, absolutely necessary to ensure success.

In putting frames together, lay the top bar groove-side up on the bench, then insert in it the end pieces, after which the bottom bar should be nailed on the ends, then reverse the frame and nail on the top bar. A 1½ in. cement-coated nail is best for the top bar, and 1 in. nails for the bottoms. Some beekeepers prefer to nail the top bar from the end pieces, but this is a matter for individual taste. If the 1½ in. nails are driven straight down through the top bar into the end bars, one will be found sufficient for each end, making a good strong job and economizing nails.

When the frames are made up they may then be wired. In America the question of the number of wires necessary and the method of wiring in order to prevent the combs sagging has been much discussed of late. In New Zealand, however, it has generally been found that three horizontal wires are sufficient,

and there seems to be little trouble with the combs stretching or sagging, as seems to be the case in America when but three horizontal wires are used. Therefore the beginner would do well to adopt the usual New Zealand method of wiring, the frames supplied by the manufacturers being provided with three holes in each end bar for the purpose.

The simplest method of wiring is to lay the frame on the bench, drive a small tack in the edge of the right-hand end bar near the top hole, and another tack in the other end bar opposite the bottom hole, taking care not to drive them right home. Thread the wire through the top holes down and through the centre ones, and from there through the bottom holes, then wind the end of the wire around the bottom tack and drive it home. Now tighten the wires, wind round the top tack, and drive it home likewise. Make a loop in the wire near the tack, and it can be easily broken by tightening the loop, or else have an old pair of scissors to cut the wire.

EARLY SPRING WORK.

Advantage should be taken of nice warm days to examine the hives, but care should be taken not to leave the hive open too long, as there is danger of starting robbing in the apiary. The principal object in the examination should be to ascertain if the bees have sufficient stores to carry them on until the regular spring flow is on. This is the most critical time of the year for the bees in regard to the risk of starvation, as when brood-rearing commences large quantities of honey are consumed. The beekeeper should therefore see that there is an ample supply in each hive, and, if not, it will be necessary to resort to feeding. In spring feeding use 2 parts of water to 1 part of sugar, feeding always inside the hive.

THE GARDEN.

W. H. TAYLOR, Horticulturist.

VEGETABLE-CULTURE.

ASPARAGUS: Stable manure should wherever possible be the chief fertilizer employed with asparagus, as it is not only a fertilizer that is nearly complete, but the residue of humus that is left keeps the soil open and covers the crowns, which tend to rise in the ground, partly because this is a natural habit, and also because of the settlement of the soil. A useful addition is to mix a 6-in.-potful of bonedust with a barrow-load of fresh wood-ashes, and apply the mixture in a dressing about 1 in. deep. Cow-manure should not be used except on very light or sandy soil. If loamy soil is treated with this manure it becomes very sticky while the wet weather lasts, and very hard when dry. Sheep-droppings are usually full of grass-seeds, and can hardly be used as a surface-dressing until most of the seeds have germinated, by which time the manure is not likely to be very valuable except as humus, and should be supplemented with blood-and-bone or a similar fertilizer. Salt was formerly considered indispensable in asparagus-culture; it is not now so regarded, and may be dispensed with as a fertilizer. Salt is, however, useful for destroying weeds, which are not at times easily disposed of by other means, as the character of the plants does not allow deep digging. In such case 4 oz. per square yard may be given; it will also dispose of slugs and other soil pests.

Nitrate of soda is the most active nitrogenous fertilizer, its effect being to force growth. Being quickly leached from the soil by rain, it should be applied only to growing plants, and then only in small doses. Three-quarters of an ounce per square yard is as much as should be given at one time, repeating it in five or six weeks, the two dressings being in most cases sufficient for the season. This amount should be applied to asparagus-beds when growth begins. Cabbages and cauliflowers recently planted should have a similar application as soon as they begin to grow. In this case spread it near the plants: it is soon washed in by rain, but it is as well to scratch it in with a rake; it should not be dug in. The statement is often met with that nitrate of soda should not be given to peas. This statement is right only in some circumstances, the fact that these plants gather nitrogen from the air does not in all cases make them independent of it if given artificially. If plenty of stable manure in a not-too-rotten condition is dug in they do not need it. It is commonly thought that if a leguminous crop is dug in it will supply all the nitrogen required. It may, however, not be

generally known that during the process of decomposition gases are generated that render the soil acid, and that nitrogen bacteria are thereby rendered inactive, so that for a time there is a total absence of available nitrogen in the soil. I have found peas to be greatly benefited by nitrate of soda applied to soil where a crop of lupins had been recently dug in.

Peas: To maintain a continual supply it is necessary to sow about every fortnight. The best plan is to sow again when those last sown are all through the ground; this saves bothering with dates.

Cabbages and cauliflowers: These should have been planted a month ago wherever the soil and climate would allow it to be done, and no time should now be lost in getting them out. The same remarks apply to lettuce, with the addition that seed also should be sown at once.

Onions: Transplanting should be gone on with as advised last month. Seed should be got in wherever possible. The best onions are grown on sandy loam, on which class of soil, other things being suitable, the bulbs finish with a fine, bright, silky skin, though they can be successfully grown on almost any soil. Clay soils give most trouble, yet if the autumn is not overwet such land will produce fine bulbs. The important points in culture are to secure a clean and firm surface to start with, to keep weeds down by cultivation, and to refrain from giving exciting fertilizers late in the season. Nitrate of soda may be given immediately after thinning seedlings, or, in the case of transplanting, as soon as the plants begin to grow, and again in each case five or six weeks later. The object is to set up vigorous growth in the young plants. If the soil is rich they may grow strong enough without the nitrate, in which case it should not be given; its purpose is to supply a deficiency, and it is not indispensable in every case. It is a mistake to excite growth when the bulbs are well formed; it would most likely result in soft, rough-skinned specimens. On clayey land onions are a rather expensive crop to grow, and it would not be wise to undertake it on a large scale. Where the soil is kindly every stage of the work is easy, and in such circumstances every settler should grow as many as he can reasonably attend to. For long keeping it is usual to grow such varieties as Brown Spanish, Brown Globe, and James's Keeping, and these are in general best for the purpose. Where conditions are specially favourable most varieties finish with long-keeping qualities. Medium-sized bulbs are in greatest demand for market purposes; bulbs weighing between 3 oz. and 4 oz. usually command a higher price than those of larger size; also, when grown for home use the smaller bulbs are most generally useful. To obtain bulbs of medium size thinnings should not be too severe, and the plants need not stand in single file. This is largely ruled by the quality of the soil. I have seen crops where the bulbs actually overlapped each other, and were all good. For boiling whole, large bulbs are best, causing a saving of labour in preparation, and being milder in flavour. The largest bulbs are grown by transplanting from autumn seeding. Fairly large bulbs of good quality can be got by sowing the right kinds in spring. Mammoth Silver King is good for this purpose. White Queen is the quickest to bulb; good-sized bulbs can be got early in the New Year; they are not keepers, but a small breadth is useful. Tree-onions are interesting subjects to grow, and look well in the garden; they throw up a seed-stem which produces a bunch of small bulbs instead of seeds: these bulbs are useful for pickling. The small bulbs should be merely pressed into the ground so as to just cover the crown. Set them in rows 12 in. or 15 in. apart, and 10 in. between the sets.

Shallots and garlic: If not already planted, these should be got in at once, the method being the same as for tree-onions. Both are used for sauce-making and chutney, and shallots are excellent pickled.

Carrots: Sow a small bed of a short-horn variety to last till the main crop is sown. Two sowings are sufficient for the season. The lines of the first sowing should not be severely thinned; if each plant stands singly that is sufficient, however close they may be. When they are no thicker than a lead-pencil the first may be drawn for use. By constantly drawing them from different parts of the bed thinning is gradually done. By this plan a vast amount of produce is taken—a larger amount than any other crop will give—and the flavour of the young roots is the best.

Turnips: These may be sown early in August. Extra Early Milan comes quickest, but I prefer Snowball, which takes very little longer. Sow only a small bed, as turnips do not stand long during warm weather. Very little thinning is necessary if the bulbs as they are ready are drawn from different parts of the bed. By exercising care in this respect the most is made of space and a great saving effected.

Radishes: These should now be sown regularly. The short varieties such as the turnip-rooted, French Breakfast, &c., are best for early sowing; the long varieties are best for hot weather. A small sowing should be made every ten or twelve days, so as to have them fresh and crisp.

Red Beet: If this salad is required during summer sow a small bed with a turnip-rooted variety. The true role for red beet is, however, as a winter salad, when tomatoes and other summer vegetables are past. The long varieties are best for winter; they should not be sown yet.

Rhubarb: The summer variety should be planted now. Set the clumps 30 in. apart in rows a yard apart, and plant deep enough to just cover the crowns. No produce should be taken in the season of planting; all the plants' energies should go to make crowns; a good crop may then be expected the following season. Established beds should be cleaned up and the soil turned over. Stable or other animal manure should not be turned into the ground; it holds water, makes the soil cold, and delays the crop. This is a point worth noticing by market growers, as the earlier the produce is marketed the better the price. Stable manure is almost a necessity to successful rhubarb-culture, but it should be given later as a top-dressing, so that the soil may not contain a lot of water-holding humus in spring.

Tomatoes: Seed may be sown during the last half of August. It is bad policy to sow earlier, except in places where there is no frost. In most places it is not safe to plant till early in November, and it is best not to keep the plants too long in the boxes. In the colder districts it may be necessary to raise the seedlings in heat. This should, however, be avoided wherever possible, and where it cannot be avoided the heat should be very mild. Experience shows that raising the seedlings on hotbeds is a plan to be avoided. The rank moisture from the manure may cause curled leaves, making the plants look sickly, and there is great danger of their getting weak and leggy before they can be pricked off. A much better plan is to raise the seedlings without heat, prick off as soon as they can be handled, and place the boxes on a mild hotbed covered by a frame in the open air, where as soon as they begin to grow they can be freely ventilated. In most cases, however, artificial heat is not required.

Early potatoes may be planted where frosts do not occur. Sprouted whole sets about the size of a hen's egg are best.

LAND FOR RETURNED SOLDIERS.

DURING the month of June an area of 101,448 acres, subdivided into 132 holdings, was thrown open for selection. Practically the whole of this area was available for selection by discharged soldiers only. One pastoral run of 21,200 acres and six small grazing-runs aggregating 34,750 acres are included in the total area. The balance of the land was suitable for mixed farming, dairying, &c., and was subdivided into 125 holdings.

An area of 18,028 acres is advertised as being available for selection during July. With the exception of some six sections of bush land in the Auckland District and four small sections in the Marlborough District the whole of this area is available for discharged soldiers only, and is subdivided into 39 holdings.

During August an area of some 17,000 acres of Crown lands situated in the vicinity of Ongarue is to be opened for selection, together with numerous other areas of Crown and settlement land scattered throughout the Dominion.

Honey-grading.—The regulations under the Apiaries Amendment Act, 1913, appointing, *inter alia*, specified ports from which alone honey may be exported, have been amended by the substitution of Wanganui for Waitara.

Wheat and Oats Threshings.—Returns of actual threshings received by the Government Statistician up to 16th June from threshing-mill owners show that till that date 4,122,132 bushels of wheat and 5,764,096 bushels of oats had been threshed out. The average yields per acre in cases where particulars of area weres furnished (covering 97 per cent. of total threshings) worked out at 34·40 bushels for wheat and 41·45 bushels for oats. The wheat average for Canterbury was 34·57 bushels, and for Otago 33·52 bushels.

REVIEWS AND NOTICES.

THE DOMINION OF NEW ZEALAND UTILITY-POULTRY STANDARDS:

CONTAINING A COMPLETE DESCRIPTION OF THE MOST POPULAR BREEDS OF UTILITY POULTRY, AS APPROVED BY THE NEW ZEALAND DEPARTMENT OF AGRICULTURE, THE NEW ZEALAND POULTRY ASSOCIATION, THE NORTH ISLAND POULTRY ASSOCIATION, THE SOUTH ISLAND POULTRY ASSOCIATION, AND THE NEW ZEALAND POULTRY CHAMPIONSHIP ASSOCIATION.—Published by the Department of Agriculture. First Edition, 1920. Government Printer, Wellington.

For many years there has be a strong diversity of opinion between fanciers and utility breeders of feathered stock as to the standards that should be adopted for judging utility fowls at poultry shows. It is now most gratifying to note that a more common ground of agreement in this respect has been arrived at between the two parties. This was brought about as a result of a conference held at Christchurch in February, 1918, of delegates representing the various associations concerned in the show movement, together with the Poultry Instructors of the Department of Agriculture. At this meeting a new series of standards was framed and unanimously agreed upon. By request, the work of preparing the necessary type illustrations of the various useful breeds of poultry dealt with, and that of publishing the complete work, was undertaken by the Department. In this connection mention may be made of the services of Mr. G. Nordstrum, of the Government Printing Office staff, who most capably carried out the artist work for the illustrations of ideal specimens of the respective breeds.

The main object aimed at in the text of the standards compiled by the conference, and in the accompanying diagrams, is to combine beauty—or, in other words, breed characteristics —with the maximum points indicative of laying-capacity and constitutional vigour. The standards therefore serve a dual purpose: firstly, as an ideal to aim for by those who enter birds in utility classes at shows, and, secondly, as a guide to mating and culling stock by those who keep poultry for profit. One of the greatest mistakes made in the past was to assume that because a bird was built on utility lines it could not be a good specimen of the breed it represented. In view of the fanciers and utility breeders having now come to a clearer understanding that poultry can possess the maximum of utility qualities and yet be desirable types of their respective breeds, it is to be hoped that in the near future the poultry shows will come into line with the shows of other classes of live-stock, whereby the adoption of the principle of one type and one judging standard for each breed will be strictly adhered to. The present system of separate classes for fancy and utility stock makes neither for the advancement of poultry shows nor the poultry industry generally. The tendency towards favouring in the one class specimens which have merely some extreme show points to recommend them, and in the other class birds probably possessing some laying-points but which are lacking in size and breed type, should be severely checked. From an industry viewpoint both classes of birds are undesirable. Therefore, why not eliminate from the show schedule both fancy and utility, and let the exhibition of fowls be looked upon as a purebred-poultry show? The ideal bird for the show-pen is one pure in every sense of the word, without being of exaggerated type of the breed it represents. There must also be a happy combination of standard requirements with points indicative of laying-power and strong constitutional vigour. The text and plates in connection with the various breeds of poultry now published in this first edition of the Dominion of New Zealand Utility-poultry Standards aim at the ideal sought for. If these have the right interpretation placed on them, there is really nothing to prevent any of the useful breeds of purebred poultry being judged by this one standard of excellence, under which breed-type and usefulness will be combined.

F. C. B.

NOTE.—The main sale of the "Standards" has been undertaken by the New Zealand Poultry Association. Applications should be addressed to the Secretary of that organization, P.O. Box 588, Christchurch. The price of the work (bound in semi-limp cloth) is 3s. including postage.

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

GOAT'S-RUE AND LIVE-STOCK.

"SUBSCRIBER," Palmerston North :—

Is goat's-rue detrimental to stock? I have had two ewes die lately in a very much blown condition, the stomachs seeming to contain a great deal of this plant. Sheep have been amongst it all along with no bad results, but a fresh draft was put on, and the trouble occurred in this lot. Has the plant the same deadly effect on cattle?

The Live-stock Division :—

The evidence so far produced as to goat's-rue being detrimental to stock is very contradictory and unsatisfactory. The Department conducted feeding-experiments twelve months ago. Stock ate it sparingly, and an infusion made from the plants was given as a drench. The animals at the conclusion of the experiments were uninjured, though they had lost condition. A farm in the Woodville district has been practically cleared of the weed by stock. The practice was to cut down the plants a few inches from the ground at the end of winter, and then turn stock into the paddocks. The weed had a good feeding-value, and no ill effects were noticed either in sheep or cattle depastured on it. Ensilage was made entirely from goat's-rue on Mr. A. Buchanan's Ashhurst property in January, 1916, and was fed to stock in August of the same year. The stock ate it readily and did well on it. Moussu and Desaint, in France, reported the deaths of a number of sheep due to eating goat's-rue, and later experiments proved that 10 lb. of the green leaf was sufficient to poison a sheep. There is no direct evidence that the plant in question has caused the death of stock in this country. Your ewes apparently died from the result of excessive fermentation brought about by gorging themselves with the plant.

ERADICATING WILD OATS ON WHEAT LAND.

M. S., Canterbury :—

Will you kindly give some information as to how to clear wheat land of wild oats?

The Fields Instruction Branch :—

To eradicate wild oats the land should be ploughed shallow or disked immediately after an infested crop is harvested, the best method being for the disk to follow behind the binder. The purpose of this is to cover the seeds of wild oats. Some of them will germinate in the autumn, the remainder will start in the spring. As soon as plants appear in the spring the ground should be ploughed shallow to destroy them and to start another growth. This should be followed in about two weeks' time by deep ploughing to bring up the seeds lying at a greater depth. Harrow after each ploughing to start growth. During the remainder of the summer wild oats should be kept down by the use of the disk or broad-shared cultivator. The next season stray plants should be hand-pulled, or, if they are still thick in a few spots, they should be cut and burned. Instead of continuing the summer fallow, sow in November, after the second ploughing, a crop of green feed. This crop, however, must be cut or fed off before any of the wild-oat seeds approach maturity. Seed is often allowed to ripen on the edges of the paddocks and fence-corners, and thus the object of much work is defeated. Finally, care should always be taken to sow clean seed-grain in cropping.

PROPAGATION OF THE SCARLET FLOWERING GUM.

"DIGGER," Waitara :—

Would you please advise me as to the best method of propagating the scarlet flowering gum.

The Horticulture Division :—

Although it is possible for experts with the proper means to raise this tree by cuttings, the usual method of propagation is by seeds, and this is the only method possible for you. The plants do not transplant well, therefore they should be raised in pots. Three-inch pots should be used ; fill these pots with a light sandy compost, and place two or three seeds in each pot. If more than one plant comes, remove all but the strongest. Transplant to the open ground when the roots have run freely through the soil and before the plants become root-bound. A glass-house is not necessary for raising the seeds, but the pots should be protected from bad weather. A sheet of glass placed over them will answer the purpose.

CHEMICAL TREATMENT OF TREE-STUMPS.

"SUBSCRIBER," Otorohanga :—

In the April issue of the *Journal*, when dealing with tree-stumps, you advise boring holes 6 in. deep and plugging them with potassium nitrate. I am not clear whether the holes should be plugged to keep out the weather after being filled with potassium nitrate or left open.

The Fields Instruction Branch :—

In addition to plugging the holes with potassium nitrate (which can be purchased in Auckland at £3 15s. per cwt., or 9d. per pound for 56 lb. lots, or lesser amounts at 11d. per pound), plug loosely with earth to prevent washing by rain. If the stumps are solid increase the number of holes in accordance ; and we would also advise leaving them for a longer period than previously mentioned before firing—say, till the end of winter.

CONVERTING A PASPALUM AREA.

P. A. GRACE, Tokaanu :—

What is the best way of getting rid of paspalum growing thickly in a 10-acre paddock of good river-silt, or what would be the best way of cropping it for pigs for the first few years ?

The Fields Instruction Branch :—

The land you mention being of a high-class character, it is suggested that you give it as thorough a cultivation as possible. Then partially fallow for at least three seasons. During intervals the area may be sown in plots of 2 acres each with Early Leaming maize, Broad-leaved Essex rape, artichokes, Blue Imperial peas, and horse-beans. The pigs may be turned on to these several breaks in rotation. Continue this until successful progress has been made, when the land should be suitable for laying down to permanent pasture.

FRUITING OF QUINCE-TREES.

A. NICOL, Tiakitahuna :—

I have a quince-tree which promises an abundant crop each year. The fruit, however, never reaches maturity, but drops off when about the size of a hen's egg. The tree is four years old and is perfectly healthy and vigorous. Can you tell me the cause of this trouble ?

The Horticulture Division :—

It is surmised that in this case the cause is unsuitable soil. The quince is reputed to thrive only on extra moist soil. This is not correct, but it will not thrive in very dry soil. A fairly deep, well-drained soil of good average quality is necessary for successful culture. It is not uncommon for many of the fruits to fall under stress of dry weather. This falling may be only sufficient to effect

a reasonable reduction in numbers, and in such cases results in a crop of good fruit. If, however, the soil is shallow and very dry the whole crop may be lost. Varieties also show varying resistance to drought. The large-fruited varieties suffer most. The variety known as Van Diemen is the most reliable cropper, and succeeds admirably where others fail.

PRESERVING BUTTER.

Mrs. J. ARCHBOLD, Avondale :—

Will you kindly let me know how much boracic per pound is required to keep butter for three months, for home use.

The Dairy Division :—

We do not recommend the use of boracic acid for the preservation of butter. If the butter is properly made from cream which has been handled in vessels which have been kept thoroughly clean and scalded with boiling water, and the same principle followed in respect to the milk from which the cream is skimmed, the addition of ½ oz. to ¾ oz. of salt to each pound of butter should be sufficient to ensure the butter retaining its keeping-quality for a reasonable length of time. It may be mentioned, however, that butter-preservatives which consist largely of boracic acid are frequently used to the extent of 35 grains to each pound of butter.

INDIGESTION IN HORSE.

"COCKY," Karamea :—

I have a draught horse which though fed on chaffed hay and oats, with a run on grass when not working, remains in very poor condition. He seems to pass far too much dung and has a very offensive odour. Can you recommend any treatment for him ?

The Live-stock Division :—

Your horse is probably suffering from a form of indigestion. This may result from bolting of the food, due to defects in the back teeth. Examine the horse's mouth, and have the back teeth filed to remove any sharp edges, which may prevent proper mastication. Give a drench consisting of one pint of linseed-oil containing 1 oz. of turpentine. Afterwards try the following powders (which any chemist will dispense for you) once daily for a week, mixed in the feed : Hyposulphite of soda ½ oz., powdered ginger 2 drams, powdered gentian ½ oz. Keep the horse supplied with rock salt to lick. The possibility of the condition being due to internal parasites should not be overlooked.

LAMENESS IN CATTLE-DOG.

H. BURTENSHAW, Bluff :—

I have a cattle-dog which has gone lame, apparently on account of soreness in the pads. The skin between the pads is also red, and the inflammation appears to be extending up the legs to the body, the hair falling out on the affected parts. It looks like mange or gout. The dog works for about two hours daily on very rough country. Would you kindly advise as to treatment.

The Live-stock Division :—

No doubt the lameness is caused by the very rough country. The dog should be put off work for at least one week. A lotion consisting of methylated spirits and water, equal parts, may be applied to the feet for five minutes twice daily. The affected parts on the legs should be dressed with sulphur ointment.

Maximum Prices of Bran and Pollard.—The Order in Council of 12th April, 1920, has been amended in the Third Schedule by the substitution of £7 15s. for £7 in the case of bran, and £9 15s. for £9 in the case of pollard.

REGULATIONS FOR CONTROL OF FIRE-BLIGHT.

Two sets of regulations under the Orchard and Garden Diseases Act for the better control and eradication of fire-blight were gazetted on 18th June, 1920, as follows :—

I. Prohibiting the Removal of certain Plants, and Bees, from the Auckland District.

1. In these regulations "prescribed area" means that portion of New Zealand comprised within the North Auckland and Auckland Land Districts.

2. No plant or portion of a plant of any variety of apple, pear, quince, or cratægus shall be sent or brought from the prescribed area into any other portion of New Zealand :

Provided that nothing in this regulation shall apply to the sending by an officer of the Department of Agriculture, under proper safeguards, of plants or portions of plants of any of the above-mentioned kinds from the prescribed area for the purpose of the identification of disease.

3. (1.) Every package of trees or shrubs, or portions of trees or shrubs, sent from the prescribed area to any other portion of New Zealand must be accompanied by a certificate in the form set out in the schedule hereto, signed by the consignor, that no plant or portion of a plant of any variety of apple, pear, quince, or cratægus is contained in the package. (2.) The certificate shall be endorsed on a tag or label securely attached to the package in a prominent position.

4. No bees shall be sent or brought from the prescribed area to any other portion of New Zealand.

5. Every person who does or omits any act in contravention of these regulations commits an offence, and is liable on conviction to a fine not exceeding £20.

Schedule : Certificate to accompany Packages of Plants.

I, the undersigned, hereby certify that no plant or portion of plant of any variety of apple, pear, quince, or cratægus is contained in this package.

Place : *Signature :*

Date : *Witness to Signature :*

II. Powers of Inspectors, etc.

1. In these regulations "Inspector" means an Inspector appointed under the said Act.

2. If an Inspector finds the disease known as fire-blight (*Bacillus amylovorus*) present in a nursery or orchard, or if such disease is known to exist in such proximity to a nursery or orchard as in the opinion of an Inspector to have rendered the infection of such nursery or orchard probable, the Inspector may by notice served on the occupier of such nursery or orchard prohibit the removal therefrom of any plant or portion of a plant of any variety of apple, pear, quince, or cratægus.

3. Such prohibition shall remain in force until withdrawn by notice served on the occupier of the nursery or orchard by an Inspector on being satisfied that the disease has been eradicated and that no risk of infection remains.

4. While such prohibition is in force in respect of any nursery or orchard no person shall take, remove, or send out of such nursery or orchard any plant or portion of a plant of any apple, pear, quince, or cratægus, or, knowing such prohibition to be in force, shall receive any such plant or portion of a plant as aforesaid from such nursery or orchard :

Provided that nothing herein contained shall prevent any Inspector from sending, under proper safeguards, specimens of plants out of such nursery or orchard for identification of disease.

5. Every person who does or omits any act in contravention of these regulations commits an offence, and shall be liable on conviction to a fine not exceeding £20.